



**LUND UNIVERSITY**

School of Economics and Management

**Master programme in Economic History**

**Punching Out? An Analysis of the Changing Impact of Strikes  
in the post-WWII US Automotive Industry**

**Dominic Mealy**  
**dominic.mealy@gmail.com**

*Abstract:* Drawing on a range of previously unused data to construct a data series of practically every strike in the US automotive industry from 1946-2002, this paper examines the changing relationship between strikes and wage determination in the post-war period. Drawing on the historical concept of the 'labour-capital accord' this study undertakes analysis on two sub-periods, 1946-1981 and 1982-2002. Through a multivariate time series analysis this study draws a number of findings that appear to contradict the current academic consensus around strikes and wages in the period after 1980. The study finds evidence of a positive strike-wage relationship for the whole period under examination.

*Key words:* strikes, unions, UAW, union-wage premium, labor-capital accord, auto

**EKHM51**

Master thesis, (15 credits ECTS)

June 2016

Supervisor: Dr Erik Bengtsson

Examiner: Professor Anders Nilsson

Word Count: 15982

I would like to take this opportunity to offer my sincere thanks to my thesis supervisor Erik Bengtsson and assistant supervisor Julius Probst for their support, encouragement and patience. I would also like to thank the staff of the Work Stoppages department of the Bureau of Labor Statistics for their assistance in locating unpublished data and the staff of the United Auto Workers Education Department for their kind cooperation.

Finally I would like to dedicate this research paper to the many millions of working women and men, living and deceased, whose lives of labour and struggle are not reducible to data on a page. May they be remembered in the struggles ahead.

# Table of Contents

Chapter 1. Introduction, Motivation and Research Design.....	4
Introduction .....	4
Motivation: .....	6
Research Design.....	8
Chapter 2. Context, Concepts and a Review of the Literature.....	10
The US Automotive Industry the UAW and Worker Power .....	10
The Era of the ‘Labor-Capital Accord’ and its Demise .....	12
Unions, Strikes and Wage Determination .....	14
A Critical Evaluation of the Literature.....	15
Chapter 3. Data and Methodological Approach: Measuring Strikes in America .....	21
Measuring automotive industry strikes in post-accord America.....	21
Unionisation data limitations .....	25
Dependent Variable.....	27
Independent Variables.....	28
Unionisation Variables.....	29
Macroeconomic Variables.....	29
Institutional Variables .....	29
Qualitative Data.....	30
Methodology .....	31
Chapter 4. Findings & Discussion .....	33
Initial Results.....	33
Quarterly Data Analysis .....	37
Quarterly Data Findings .....	38
Qualitative Data.....	39
Chapter 5. Discussion and Conclusions.....	40
Discussion .....	40
Conclusions .....	42
Bibliography .....	43
Appendix A.....	47

# List of Figures

Figure 1. Public and Private Sector Unionisation.....	5
Figure 2. Aggregate Strike Frequency 1946-2014.....	5
Figure 3. Automotive and Private Sector Unionisation.....	12
Figure 4. Aggregate Strikes and Unionisation.....	14
Figure 5. Automotive Worker Strike Frequency and Percentage of the Workforce Involved.....	25
Figure 6. Automotive Unionisation.....	27
Figure 7. Automotive Worker Real Earnings.....	28
Figure 8. Strike Motivation 1967-2007.....	39

# List of Tables

Table 1. Unlagged Determinants of Real Earnings.....	35
Table 2. Lagged Determinants of Real Earnings.....	36
Table 3. Quarterly Unlagged and Lagged Determinants of Real Earnings.....	38

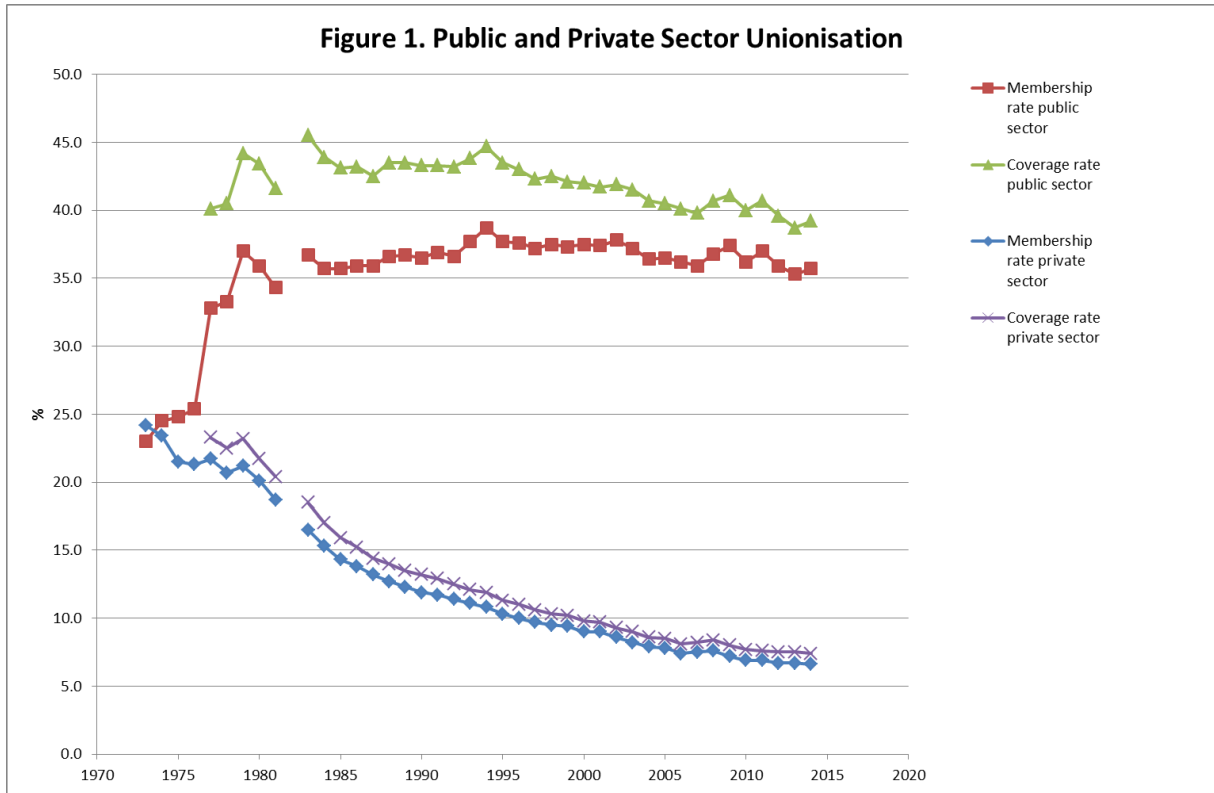
# List of Abbreviations

UAW – United Auto Workers  
BLS – Bureau of Labor Statistics  
CPS – Current Population Survey  
CES – Current Employment Statistics  
-MORG – Discontinued BLS databases  
FMCS – Federal Mediation and Conciliation Service  
NLRB – National Labor Relations Board  
OECD – Organisation of Economic Co-operation and Development  
AFL – American Federation of Labor  
CIO – Congress of Industrial Organisations  
IWW – Industrial Workers of the World  
CWAUW – Carriage, Wagon and Automobile Workers’ Union  
UAAVW – United Automobile, Aircraft and Vehicle Workers’ Union  
PATCO – Professional Air Traffic Controllers Organization  
GM – General Motors  
SIC – Standard Industrial Classification  
NAICS – North American Industrial Classification System  
OLS – Ordinary Least Squares  
GLS – Generalized Least Squares

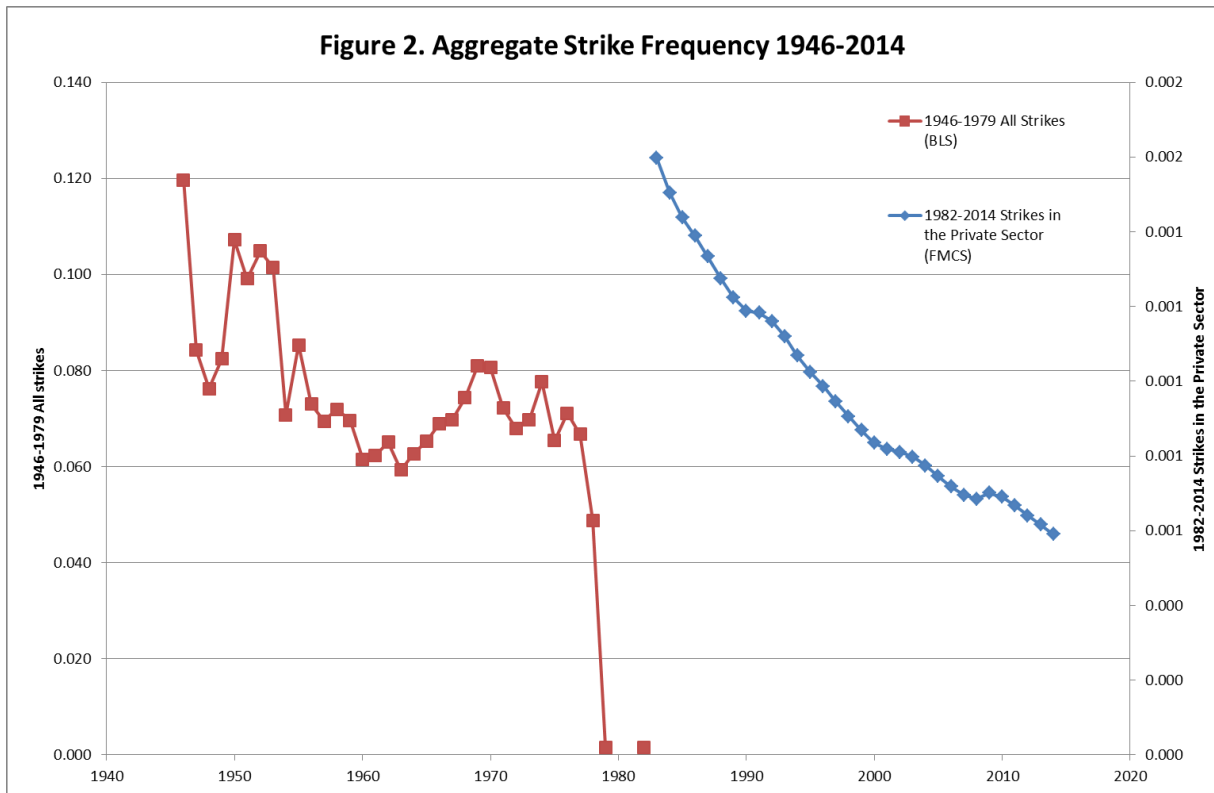
# Chapter 1. Introduction, Motivation and Research Design

## Introduction

There was a time, not so very long ago, that the might of organised American labour was able, with ease, to immobilise vast swathes of the US industrial economy, winning substantial increases in pay, pensions and sickness benefits. While never expressing a challenge to existent social relations labour was able, through the strength of its organisations and the latent power it held over the start and stop of the forces of production, to exert an influence over politicians and economic policy, to the extent that Richard Nixon was able to state, “No program works without Labor cooperation” (quoted: Rosenfeld, 2014: 2). Throughout its rise to the position of world superpower the United States served as a vast social laboratory; laying the path for the development of the forces of labour and production. Relations between labour and capital were overtly, indeed violently, conflictual over the first half of the twentieth century (Rubin, 1986). Furthermore, in the decades immediately following World War II, as US manufactured commodities and political influence permeated the globe, US domestic strike rates stood amongst the highest in the developed world (Goldfield, 1987). The relative strength of organised labour in the United States and the economic terrain upon which its power was built has shifted profoundly in the subsequent decades. As Figure 1 clearly shows private sector union membership and collective bargaining coverage, measured as the percentage of the non-farm workforce, has fallen precipitously since the early 1970s, from around a quarter of the workforce to single digit figures. This fall corresponds to an even more dramatic collapse in the most significant measure of labour militancy – the strike – whose once commonplace occurrence has become a comparative rarity compared to the high points of struggle in the early 1950s and late 1960s (see Figure 2). Concurrent with this, the percentage of the American workforce employed in manufacturing has similarly be-lined, with real wages stagnating, shifts that economists have linked to the erosion of blue-collar unionised jobs (Stiglitz, 2013, Piketty, 2014). The pattern and timing of these events were, as Armstrong et al. highlight, unique amongst developed nations, though we might add they have provided a pattern that has since been followed by much of the OECD (Armstrong, Glyn & Harrison, 1984). Furthermore, as Beverly J. Silver has highlighted, this apparent decline in the significance of the labour movement, has contributed to a “crisis in the once vibrant field of labor studies” (2003: 1). While earlier scholarly contributions on the state of the US labour movement, such as Freeman & Medoff’s, celebrated work *What Do Unions Do?* (1984) written early in the decline, was able to quantitatively highlight the innumerable positive contributions provided by unions to workers and the economy at large and even end on a hopeful note, more recent comparable works such as that of Jake Rosenfeld read more like laments to a lost world (2014).



**Figure 1. Public and Private Sector Unionisation.** Graph showing unionisation levels, measured both as the percentage of the workforce who are members of a union and the percentage of the workforce covered by a collective bargaining agreement for both the private and public sectors. Source: Hirsch & Macpherson, 2016 and BLS CPS-MORG file.



**Figure 2. Aggregate Strike Frequency 1946-2014.** Showing aggregate strike data, 1946-2014 by frequency per thousand worker, n.b. the pre-1979 data includes all strikes, the post-1982 data includes only private sector strikes. Source: BLS Work Stoppages Caused by Labor-Management Disputes in 1979, FMCS Work Stoppage data file.

## **Motivation:**

Given the indisputable significance of the changing impact of unions, strikes and demands over wages, hours and conditions on the development of the modern world, one does not need to assign any ultimate emancipatory potential to these forces of labour in order to recognise the significance of their study. Indeed the overwhelming majority of scholars cited in this paper present no such claim but rather likely, at most, agree with Freeman & Medoff that labour unions contribute positively to the “well-being of the free enterprise system” (1984, p.251). Furthermore, while an extensive literature exists highlighting the positive impact of unions on the wages and conditions of workers there is also a good deal of literature highlighting the positive role played by unions in the functioning of the economy as a whole (Freeman & Meddoff, 1985, Bennett & Kaufmann, 2007, Stiglitz, 2013). Finally, it should be recognised in any discussion of the changing impact of labour unions that, even in the United States where so called ‘business unionism’ has been the norm, their activities have rarely been restricted purely to the ‘bread-and-butter’ issues of its own membership. In the United States the labour movement played a paramount role in the fight for civil rights and the broader struggle against racism both within and outside of the workplace, to say nothing of the role unions have played on a global scale in terms of the struggle against authoritarian regimes of both the left and right (Meier & Rudwick, 2007, Silver, 2003).

A fairly rich, albeit far from extensive, literature exists providing quantitative analysis of the changing impact of strikes and unions on wages in the post-WWII USA. Taken as a whole this literature provides a relative consensus around a number of key conclusions that provide the starting point and basic assumptions upon which this study is based. The first of these is that; from at least the aftermath of World War II until at least the early 1980s union influence exerted a positive impact on the wages of unionised workers (Gregg Lewis, Flanagan, 1976 Penvavel & Hartsog, 1984, Card 1996, Kuhn, 1998, Wallace, Leicht & Rafflovich) and that this ‘union-wage premium’ continues to exist even with declining union membership (Rosenfeld, 2006 & 2014). The second of these is that strikes similarly, though less definitively, contributed positively to rising wages during the period following World War II until the early 1980s, at least within heavily unionised areas of the economy (Paldun, 1989, Rubin, 1986) but critically that from the early 1980s onwards this relation completely broke down with a total decoupling between strikes and wage determination taking place (Rosenfeld, 2006, Rosenfeld, 2014). Each of these studies naturally possesses its own set of strengths and limitations and these shall be investigated in relative detail in Chapter 2. Nevertheless, in terms of framing and motivating this papers research, these studies possess a number of primary limitations. First amongst these is that the overwhelming majority of these studies examine data only from the period immediately after World War II (albeit with some looking at data in the decades preceding this) until the late 1970s or early 1980s. As shall be discussed, this period constituted a unique episode in US economic history in terms both of broader macroeconomic trends and in terms of a particular institutionalised relationship between capital and labour, rendering their findings temporally contained. The reasons for this limitation are two fold; first there has been an apparent declining interest amongst economists and economic historians in quantitatively examining the interrelationship between



unions, strikes and wages since the 1980s and second that there are innumerable limitations to the quality and consistency of the available data on strikes following 1979, limitations that will be discussed in depth in Chapter 3 of this paper (Silver, 2003, Rosenfeld, 2006). Second, the majority of these studies choose only to examine the union-wage premium in isolation, excluding from their research any examination of the impact, direct or otherwise, of strikes on wages, or the role of strikes in terms of the creation of the union-wage premium, this in spite of the fact that, at least intuitively the power of labour unions rests on the latent power to halt production, certainly, as Rosenfeld puts it “the strike was once thought of as labor’s most potent weapon in resolving disputes over compensation matters” (2006, p.235). Finally, almost all of these studies examine these processes on a purely aggregate level and where a differentiation is made, it is mainly in regard to the difference between union and non-union sections of the workforce rather than at the industrial level (Flanagan, 1976, Ashenfelter, et al, 1972, Mitchell, 1980). The problems with the high levels of aggregation involved in these studies and the need for further investigation of these processes on an industry level are highlighted repeatedly by the authors themselves yet almost no study has undertaken this research (Rubin, 1986, Morris, 2003) <sup>1</sup>. While studies undertaken on the aggregate level provide us with invaluable insights into the relationship between unions, strikes and wages and constitute a necessary starting point for any further investigation of these phenomena further research on the industrial level is pressingly required.

In order to highlight the crucial limitation of drawing conclusions purely from an aggregate level it is useful to draw on the distinction made by Erik Olin Wright on the difference between the twin sources of labour power, namely ‘associational’ and ‘structural power’ (2000). Wright defines ‘associational power’ as “the various forms of power that result from the formation of collective organizations of workers”, a definition that Wright uses quite broadly to encompass a range of organisations, but that, for the purposes of the US context and this paper, we can take to mean labour unions (2000: 962). So called ‘structural power’ on the other hand is defined by Wright as the “power that results simply from the location of workers within the economic system” (2000: 962). Considered in this manner it is clear that studies that rely purely on highly aggregated union and strike data, even those rare studies that provide broad analysis based on industry, obscure the profound imbalances of class power held by different groups of workers, in different industries over time. The relative associational power exerted by different unions has varied greatly throughout the post-war period in the US, both in terms of the size of the union density, the approach and outlook of the leadership and in terms of associational cultures of struggle within those unions. Similarly different groups of workers have, at different times exerted profoundly different levels of structural power. With this power source being determined not only by the ease with which production can be brought to a standstill but also in terms of the industries general economic significance and forward and backward linkages within the chains of production. For example an effective strike carried out by forestry workers would require the simultaneous withdrawal of a very sizeable proportion of the workforce to prove effective, whereas a

---

<sup>1</sup> Jake Rosenfeld’s paper constitutes a rare exception, however even here he uses very broad industry categories (2006).

relatively small number of factory workers, placed at one vital node in the production chain can bring a corporation to its knees.

## **Research Design**

Building on the limitations of this prior research the current investigation has chosen to concentrate primarily on the influence of strikes on wages, over the longest possible period following the Second World War and to investigate only one vital industry. In choosing a vital industry with which to investigate the changing relationship between strikes, unions and wages one industry in particular stands out as the obvious choice, namely: the automotive industry. The justifications for the choice to focus exclusively on the automotive industry are numerous but preeminent amongst these is the long-term significance of the industry in terms of the economic output of the US economy, its contribution to national income and its significance as the single biggest employer of production workers for much of the twentieth century (Persons, 1995, Silver, 2003, Rosenfeld, 2014). Furthermore the industry both pioneered new forms of capitalist production and served as a trend-setter in terms of both US labour relations and wider trends within the US economy (Katz, 1985, Persons, 1995, Rosenfeld, 2014). With regard to the definitions of labour power laid out by Wright the industry has, at least historically speaking, constituted a *perfect storm* of worker power, wherein workers have held both high associational power due to the strength of the United Auto Workers and high structural power through the Fordist mode of production and the tremendous importance of the industry in terms of the US economy. Finally, the automotive industry provides a useful case study for data analysis owing to it being highly unionised with a relatively high frequency of strikes over many decades enabling a sufficiently large sample size for statistical testing.

Building upon the insights derived from previous studies this paper will therefore attempt to answer the following primary research question:

*What was the impact of strikes on wages in the post-WWII US automotive industry and how did this change over time?*

To investigate this question this paper employ previously unreleased and unexamined data on practically every strike occurring in the automotive industry from 1946-2002. A multivariate time-series analysis will be employed as the primary mechanism with which to investigate this phenomenon although additional qualitative data shall also be employed. In order to examine the changing effect of strikes on wages over time in a manner providing a sufficient number of observations for econometric analysis two sub-periods shall be defined. Building on the definitions of the period of 'labour-capital accord' and 'post labour-capital accord' derived from the literature the data shall be subdivided into two corresponding periods, namely 1946-1980 and 1981-2002. In order to avoid omitted variable biases sufficient controls for macroeconomic and institutional changes shall be incorporated into the model. As a means of strengthening the discussion of the findings the paper will employ a further set

of qualitative data derived from previously a unpublished data source on the motivation of the major strikes occurring at Chrysler, General Motors and Ford between 1967-2007.

The purpose of this study is therefore twofold: First, it aims to provide a contribution that both expands and refines the existent (largely aggregate) literature. Second, it aims to test the assumptions drawn from this literature, for one industry and one section of the US workforce. One might object that this choice is highly unrepresentative of broader trends in US relations between labour and capital and that no generalised conclusions can be drawn from it. This objection is ill founded however, for in choosing one of the most significant industries of the twentieth-century and one of the historically most militant sections of the working class we isolate in a sense, an upper bound of the relation between strikes and wages. The findings drawn from this case study can therefore be seen as an upper limit to strike-union-wage determination, for at least the private sector. This is of particular relevance to the analysis of these issues in post-accord America, for if a strike-wage relationship cannot be found for the automotive industry, there is an argument for saying that it cannot be found anywhere.

Beginning with a brief history of the US automotive industry through the focus of class relations the paper will lay out the primary categories and theoretical assumptions that inform its research. These will include a historical and theoretical explanation of the 'labour-capital accord' and its breakdown, and a theoretical analysis of what labour unions are and how they relate to wage determination. This will be followed by a detailed critical analysis of the literature to date. Chapter 3 will present the econometric model used to investigate the research question, along with a detailed examination of the data used and its limitations, with the results and findings being discussed in Chapter 4 and the overall conclusions in Chapter 5.

## Chapter 2. Context, Concepts and a Review of the Literature

In order to adequately develop a model with which to investigate the changing impact of strikes on wage determination in the US automotive industry one must first understand the basic pattern of the history of both strikes and the unions in the development of the automotive industry and in order to adequately periodise the data certain historical and theoretical categories must be clarified. The following section provides an overview of the historical context for the present study, followed by a clarification of the role of unions in wage determination and the periodisation of the labour-capital accord. It also provides a detailed overview of the current literature on the changing relationship between both unions, strikes and wages.

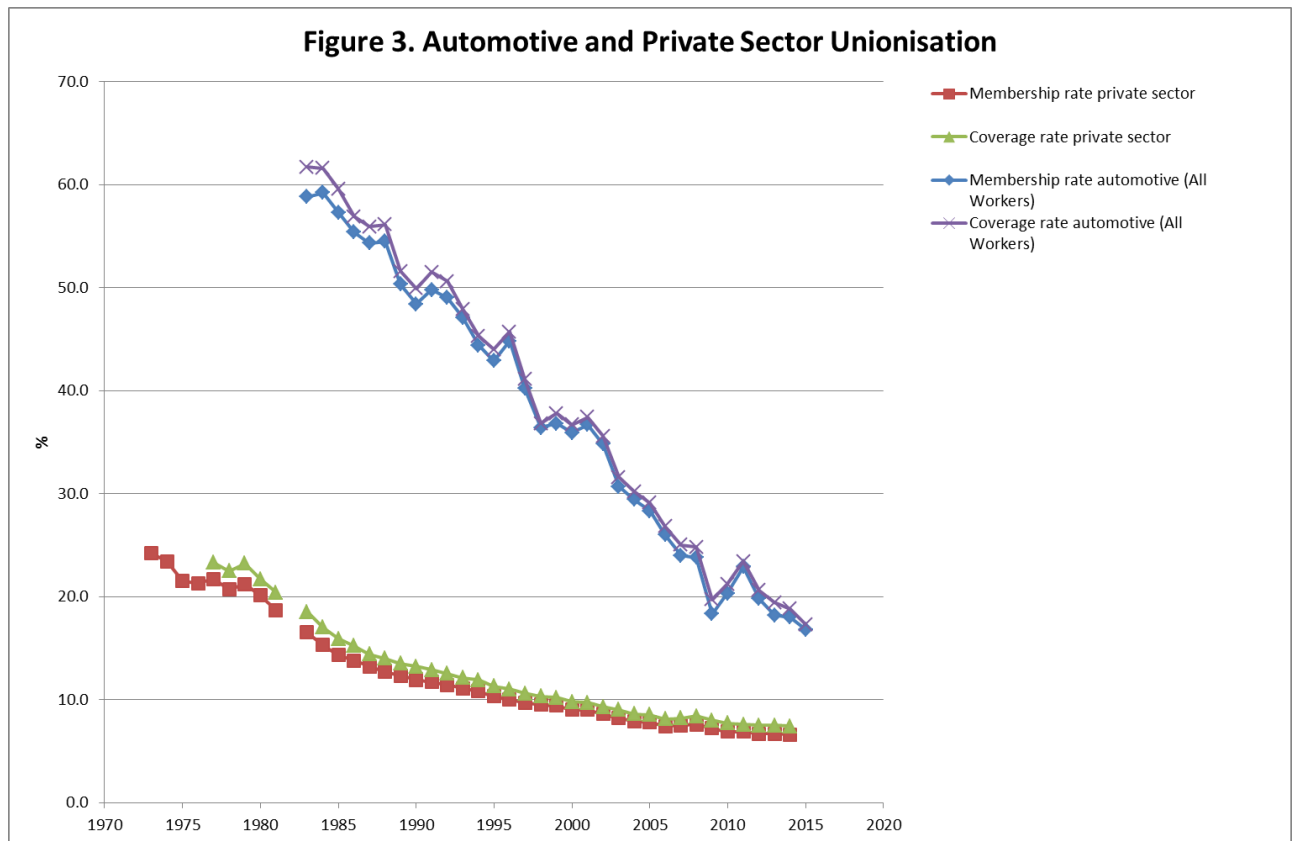
### **The US Automotive Industry the UAW and Worker Power**

Turn of the century auto production was carried out in relatively small Detroit workshops with skilled work teams engaged together in the unitary craft production of individual automobiles (Garthman, 1986). The introduction of standardisation, interchangeable parts, and the assembly line division of labour that epitomised 'Fordism' and came to dominate the organisation of factory production for much of the twentieth century, can, in no small part be traced to the need to break these early forms of worker power (Silver, 2003). These shifts in production, which dispensed with the need for troublesome skilled mechanics and instead brought many thousands of largely unskilled often black or foreign born labourers into the workforce, did away with the old craft unions (Garthman, 1986). While this process of homogenising and deskilling auto production had the initial effect of significantly disempowering the workforce, it ironically laid the ground work for the later development of far more powerful expressions of class power. The Fordist mode of production created both interconnected assembly lines that could be successfully disrupted even by comparatively small sections of the workforce and the increasing integration of production corporations made up of geographically clustered assembly plants wherein strikes could spread like wild fire (Silver, 2003).

Early attempts to organise the workforce, made by the AFL-affiliated Carriage, Wagon, and Automobile Workers' Union (CWAU) and later the more radical and independent Industrial Workers of the World (IWW), were both seen off by managerial and police repression (Garthman, 1986). Met with such high levels of repression the workers of the auto industry shared the fate of millions of other American workers with the collapse of labour unionism in 1920s America, although the newly amalgamated independent industrial union, the United Automobile, Aircraft and Vehicle Workers' Union (UAAVW) was able to make some inroads into the major Detroit plants (Goldfield, 1986, Garthman, 1986). Matters changed drastically with the onset of the Great Depression and the rise of the Congress of Industrial Organisations (CIO) aligned auto industrial union the United Auto Workers (UAW). A major victory was achieved by the UAW on December 30, 1936 with the sit-down strike at General Motors' Fischer Body Plants No.1 and No.2 in Flint Michigan (Silver,

2003). The Flint plants produced the majority of General Motors' Chevrolet engines and the sit-down strike caused a collapse in production that crippled the whole corporation, with output falling from 50,000 automobiles a month in December 1936 to 125 in February 1937 (Silver, 2003). General Motors' was forced to abandon its anti-union stance, signing a contract with the UAW on March 12, 1937. While this victory for the UAW set a pattern that was to be followed by the two other motor giants with Ford and Chrysler moving to recognise the union it also set the pattern that was to characterise labour-capital relations for the next thirty five years, namely an openness to cooperation and negotiations with the UAW in as much as it pursued "responsible unionism" combined with the pursuit of two interconnected processes of restructuring aimed at breaking union power. Tactics that David Harvey has termed the 'spatial' and 'technological fix' (1999: 431-5).

The 'spatial fix' entailed the division of auto parts production into smaller units and the relocation of production to plants away from the established union strongholds to small rural towns, particularly in the American South. This attempt to defang union power through the diffusion of production provided only temporary relief for auto manufacturers however, with the UAW proving quite successful in organising the new production sites, epitomised by the 1979 UAW shutdown that extended UAW contracts to all Southern plants (Goldfield, 1987, Silver, 2003). The failure of this strategy combined an increasing squeeze on profits produced by the rising expense of wage, pension and fringe benefit payments to workers, coupled with increased international competition from Japanese car manufacturers led to increased outsourcing of production abroad and the intensification of the 'technological fix', a process that had been developing over many decades, to replace human labour with machines (Eichengreen, 2007, Silver, 2003). As US auto manufacturers increasingly moved production overseas, Japanese car manufacturers began opening plants in the USA, plants that proved much more resilient in the face of union organisation drives (Armstrong, Glyn & Harrison, 1984). Taking place as it did in the context of the early 1980s recession, the rise to power of Ronald Reagan and the broader decline of auto manufacturing as a contributor to US national output the structural and associational power of the UAW fell dramatically (Silver, 2003). Moving from a position of unquestioned strength to one of increasing weakness, a shift which is greatly evidenced by the widely cited rise of concessionary bargaining on the part of the UAW in the 1980s and 1990s (Freeman & Medoff, 1984, Persons, 1995, Rosenfeld, 2014). While the UAW has retained a comparatively high proportion of membership amongst auto workers as compared to other private sector industries (see Figure 3) its overall level has declined precipitously since the early 1980s, furthermore these figures are no doubt misleading given both the retained membership of many retired or unemployed auto workers and a drive by the UAW to maintain membership through the organisation of workers outside of its traditional constituency.



**Figure 3. Automotive and Private Sector Unionisation.** Unionisation as measured by both membership density and the percentage of workers covered by a collective bargaining agreement for all payroll workers in the ‘Motor Vehicles and Motor Vehicle Equipment’ industry and for all payroll workers in private manufacturing. Source: Hirsch & Macpherson, 2016 and BLS CPS-MORG file.

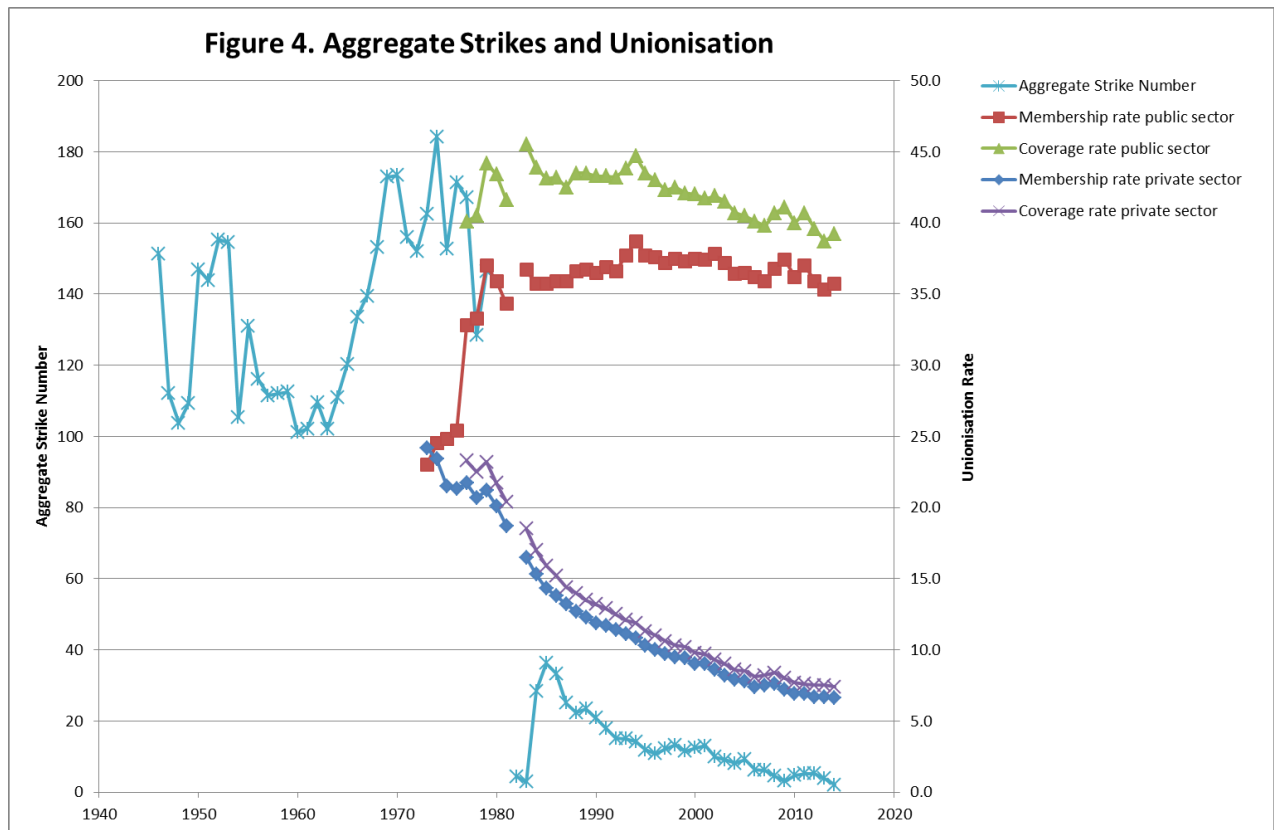
### The Era of the ‘Labor-Capital Accord’ and its Demise

While it should be evident from the above historical overview of labour-capital relations within the automotive industry that relations between employers and the UAW were at all times internally unstable, and far from seamlessly homogenous for any extended period of time, they can nevertheless be said to fall within three definable periods of industrial relations: the pre-labour-capital accord period, the period of labour-capital accord and the post-labour-capital accord period. The temporal demarcation of US labour relations in this manner is broadly supported by the literature, although the precise length of each period differs somewhat between different scholars (Rubin, 1986, Wallace, Leicht & Raffalovich, 1999, Rosenfeld, 2006, Rosenfeld, 2014).

The origins of the accord can be found in 1935 with the signing of the Wagner Act, and was solidified by the establishment of the Federal Mediation and Conciliation Service (FMCS) in 1947 (Rosenfeld, 2006). While prohibiting labour from making claims over the ownership and management of production these legal changes guaranteed the right to strike over economic and safety issues (Rosenfeld, 2006). These changes ushered in a new period in US industrial relations that is generally referred to as the ‘labour-capital accord’ a period generally said to have lasted from the end of WWII until sometime between the late 1970s and the early 1980s (Rubin, 1986, Wallace, et al., 1999, Rosenfeld, 2006, Rosenfeld, 2014).

While the period did constitute compromise between capital and labour, where capital accepted higher wages and fringe benefit payments in exchange for higher productivity, the period was nevertheless very far from being one of mutual accord in the manner the name would suggest (Wallace, et al., 1999). While these changes brought to an end the incredibly violent labour-capital conflicts of the 1930s, they also ushered in a period in which strike levels rose to some of the highest in the developed world, becoming a regular feature of US life (Goldfield, 1987). Furthermore the period was characterised by increasingly regular violations on the part of management of the regulations surrounding the FMCS combined with changes in the organisation and location of production directed at limiting and even breaking established union power (Farber & Western, 2002, Armstrong, et al., 1984).

While these violations highlighted the decline of the accord the events of 1981 brought it to a clear symbolic close. When striking air traffic controllers refused to return to work, the newly elected president Ronald Reagan ordered the entire 11,000 workforce to be fired (Armstrong, Glyn & Harrison, 1984). This intervention by a US President on behalf of management was unprecedented since the 1920s and heralded a new era in which the surety of collective bargaining rights and the right-to-strike could no longer be taken for granted. This profound shift in governmental policy toward labour unions was reinforced later in 1981 when two of the five seats of the National Labor Relations Board (NLRB), the supposedly impartial body for the mediation of union elections and the administration of labour law, were filled by anti-union Reagan administration appointees (Farber & Western, 2002: 386). As Goldfield highlights however, these changes did not come as a bolt from the blue but rather represented the culmination of over a decade of increasingly hostility on the part of capital toward organised labour (1987). These institutional changes, combined with broader shifts in the composition of the US economy, greater deregulation, global competition and renewed ferocity by management unequivocally broke the accord (Rosenfeld, 2014). As Figure 4 illustrates unionisation levels precipitously, especially in the private sector, and strike frequencies plummeted. Faced with these multi-faceted assaults the labour movement was forced onto the defensive, accepting increasingly conciliatory agreements that further undermined membership with previously centralised systems of wage bargaining in the auto industry breaking down (Rosenfeld, 2014).



**Figure 4. Aggregate Strikes and Unionisation.** Aggregate number of strikes and unionisation levels in the public and private sectors, n.b. for ease of visual comparison the strike number has been rescaled by a factor of 0.03 Source: BLS Work Stoppages Caused by Labor-Management Disputes in 1979, FMCS Work Stoppage data file, Hirsch & Macpherson, 2016 and BLS CPS-MORG file.

## Unions, Strikes and Wage Determination

Before proceeding further it is important to clearly define the present studies understanding of unions and strikes and their theoretical relationship to wage determination. Neo-classical economists have sometimes seen labour unions and their impact on wage determination as analogous with that of a monopolistic firm, monopolies that produce market imperfections and an inefficient allocation of resources; however upon closer examination this understanding proves wholly inadequate (Mitchell, 1980, Freeman & Medoff, 1984, Wright, 2000). As Mitchell points out, while a firm with a product monopoly initially raises the price of a product relative to the cost of production, after which it should exert no influence on the rate at which the price increases relative to other prices, unions do not operate in an analogous manner (Mitchell, 1980). If labour unions and their relation to wages truly functioned in the same way, we would expect a union wage premium over that of non-union workers to be established early on in the period of union growth and labour institutionalisation and maintained thereafter, a pattern that contradicts the historical and empirical evidence (Mitchell, 1980). While the clear motivation of a monopoly firm is simply the maximisation of profits, the goal of a labour union is not simply that of wage maximisation for its members (Freeman & Medoff, 1984). Rather labour unions normally pursue a number of different goals, including maintaining employment, increasing health and safety and ensuring promotion based on seniority as well as, of course, the increase of wages



and fringe benefits (Mitchell, 1980). One might add that these goals are not pursued simultaneously nor uniformly. Furthermore, it should be recognised that unions do not operate in the manner of firms in the simple sense that, no matter what their strength, they do not possess the final say on wages: unions don't set wages, capitalists do. Of course union power exerts pressures on employer determination of wages, sometimes tremendous pressure, but this relationship is far from straightforward (Ashenfelter, et al, 1972). Employers are able, as we have seen, to replace workers with machines through automation, to relocate production to other regions and other countries, or even, as with the PATCO air traffic control workers, fire the workforce and rehire non-union replacement labour (Mitchell, 1980). Furthermore, labour union leaderships rarely, if ever, act simply as the democratic mouthpiece of their membership, union leaders routinely make and moderate demands in relation to the balance of power of the union and the strength and profitability of the firm, thereby at times pursuing goals and accepting concessions at variance with the preferences of their rank-and-file (Flanagan, 1976). Therefore, as Rubin highlights, the relationship between labour unions and wage determination, is overshadowed by their relationship of labour to capital, that is, the relative balance of class power (1986).

### **A Critical Evaluation of the Literature**

The current literature can be divided into two broad categories, those that deal with the union-wage relationship and those that deal with the strike-wage relationship, with some papers examining both relationships together. These papers can furthermore be divided temporally into two categories, those that deal with the strike-wage and/or union-wage relationship before 1982 and those that deal with the strike-wage and/or union-wage relationship after 1982. While there are a number of papers quantitatively exploring aspects of labour relations within the auto industry, no previous study examines the relationship between strikes and wages in the industry as a whole<sup>2</sup>. The following section shall provide a critical overview of these works, presenting an assessment of their relative strengths and weaknesses, the contributions they make in shaping the assumptions of the current study and the limitations that they present that necessitate further research.

Amongst the earliest studies to quantitatively analyse the existence of the union-wage premium was Gregg Lewis' paper on the relative wage effects of US labour unions for the period 1920-1958 (1963, 1964). Gregg Lewis concluded that there existed during this period a 10-15 percent union-non-union wage differential (Mitchell, 1980). The analysis was updated and expanded upon subsequently by Pencavel & Hartsog who extended the analysis from 1920 until 1980 (1983). Pencavel & Hartsog analysed aggregate unionisation data drawn from the biennial survey published in the Directory of National Unions and Employee Associations through ordinary least squares (OLS) and generalised least squares (GLS) procedures (1983). Their study concluded that for the period 1920-1980 there existed a strong positive impact of unionism on the average wage of union workers relative to that of non-

---

<sup>2</sup> Notable example's include Zetka's 1992 paper on wildcat strikes from 1946-1963, Person's study on the impact of strikes on steel suppliers stock prices of strikes in the auto industry (Zetka, 1992, Persons, 1995).

union workers (Pencavel & Hartsog, 1980). Importantly they argue based on aggregate data analysis that the magnitude of this union-wage-premium shifted over time, with unionism exerting a declining wage effect from the late 1960s until the late 1970s (Pencavel & Hartsog, 1980). Comparing their findings with cross-sectional data for the 1960s and 1970s however the authors found no such evidence of a decline. Their unionisation data nevertheless possessed various limitations, with the surveys from which it was drawn being biennial and hence providing data not for every year but rather every other year, furthermore they were unable to produce a satisfactory explanation for the discrepancy between the time-series and the cross-sectional data (Pencavel & Hartsog, 1980). Despite these limitations the study would seem to suggest that both before and during the period of labour-capital accord unions exerted a positive impact on union wages, and potentially that this relationship declined in the decade leading up to the breakdown of the accord.

The main conclusions of this paper corroborate the findings of an earlier paper by Ashenfelter, Johnson and Pencavel (1972). Employing a simultaneous equation model to compare aggregate wage determination in union and non-union manufacturing from 1914-1963 the paper argues that the aggregate rate of change of money wages in manufacturing was higher than they would have been without a union effect, with periods of high growth in union membership and high strike activity such as the 1930s exhibiting the greatest effect (Ashenfelter, Johnson & Pencavel, 1972). Similarly the paper argues that from 1954-1963 labour unionism acted as a major factor in insulating manufacturing wages from the short-term fluctuation of macroeconomic forces (Ashenfelter, Johnson & Pencavel, 1972). Furthermore the papers findings suggest an interrelationship during the period of study between union and non-union wages, postulating a significant spill-over effect of union wages on non-union wages and vice-versa (Ashenfelter, Johnson & Pencavel, 1972). This study possesses a number of key advantages over previous research in that it develops a model that controls for changing institutional, social and economic factors (Rubin, 1986). The preeminent survey of studies covering the relationship between unions and wage determination before and during the period of labour-capital accord is that of Freeman and Medoff (1984). In collating and expanding upon the literature it made a clear case for the positive impact of unionisation not only on the wages of unionised workers but also on non-union members, particularly in industries and regions with a high union density (Freeman & Medoff, 1984). The most recent attempt to bring the analysis of the union-wage-premium up to the modern day can be found in Rosenfeld (2014). Rosenfeld argues that unions continue to raise wages for their own members relative to the wages of non-union members and furthermore, that, despite falling union membership unionisation and the union-wage-premium continue to exert upward pressure on wages for non-union workers in heavily organised industries and regions (2014).

An important early work examining the relationship between strikes and wages during the period of the capital-labour accord, albeit on an international, rather than purely US level is that of Paldam (1983). This study argues that an observable positive strike-wage relationship can be found between 1948 and 1975 in 17 OECD countries. Paldam elaborated on these findings in his 1989 paper which developed a statistical theory to explain the quantitative

findings of the preceding paper (1989). The theory predicts a strong, mutually interdependent positive correlation between rises in nominal wages and the number of industrial conflicts and furthermore, predicts a positive correlation between rises in real wages and the number of conflicts, albeit with a stronger correlation for the former (Paldam, 1989). If this theory is indeed correct we should expect the coefficient of the strike variables to be positive and significant for the periods of high strike frequency.

Combining an analysis of both the relationship between unions, strikes and wages Hibbs' 1977 study, provides empirical support for a positive determination between both unionisation and strikes on wages across the developed world during the period 1951-1972 (Hibbs, 1977). One of the most significant papers published to date concentrating on the US strike-wage relationship is that of Beth Rubin (1986). Along with the work of Rosenfeld (2006, 2014) this paper provided the most significant influence on the theoretical and methodological approach of the current paper. Rubin study goes much further back in time than the present study however, covering data from 1902 until 1976 (1986: 618). Nevertheless in accordance with the approach adopted here Rubin subdivides this period in relation to the labour-capital accord, with the data being divided between 1902-1940 and 1949-1976 (1986). The paper measures union organisation as union density, that is, the percent of the non-agricultural workforce organised into unions and measures strikes as strike frequency, that is the number of strikes per thousand workers and wages as the percent rate of change of hourly money wages for non-supervisory production workers (Rubin, 1986). Building upon the limitations of much of the more economic literature the study takes great care to control not only for macroeconomic fluctuations but also institutional changes, the latter being incorporated through the use of dummy variables for the major changes in the labour law affecting industrial relations including the Wagner Act of 1935, the Landrum-Griffin Act of 1959, the Taft-Hartley Act of 1947 and the Kennedy-Johnson wage and price controls (Rubin, 1986). The model furthermore incorporates a control for capital strength, measured by corporate profits for the union and non-union sectors (Rubin, 1986). Employing a multivariate linear regression with generalised least squares (GLS) estimation the study undertakes an analysis of the whole period, the pre-accord period and the period of accord, with a subdivision between the unionised and non-unionised sectors for 1949-1976 (Rubin, 1986). In contrast to some of the earlier studies the paper does not find a strong positive relationship between either unionisation or strikes on wages in the pre-accord period, with market forces and employment conditions dictating compensation (Rubin, 1986). What small statistical significance is detectable for unionisation is explained by Rubin as being better explained by the concentration of unions in more profitable industries rather than through unionisation itself (Rubin, 1986). This picture is at total variance to the one drawn for the post-WWII accord period, wherein Rubin finds a strong positive relationship between unionisation and wages and, significantly, a strong strike-wage relationship, albeit only in highly unionised areas of the economy (Rubin, 1986). Furthermore the paper finds that post-WWII changes in labour legislation such as the Landrum-Griffin Act and the Kennedy-Johnson wage and price controls generally benefitted capital over labour (Rubin, 1986). The findings of the paper would therefore suggest that a positive relationship between unionisation and strikes is to be expected in the post-WWII automotive industry for the

period of the labour-capital accord and furthermore suggests that, as the union density breaks down and the strike frequency falls, so to would the corresponding union-wage and strike-wage relationship. The paper furthermore contains a significant finding that influences the approach to strike variable measurement in the present paper. Rubin found that strike volume, measured as the person-days lost to strikes, did not attain levels of statistical significance and that, even when lagged by one year, it appeared only occasionally significant, whereas strike frequency was found to be consistently significant in the manner hypothesised regardless of lag for the post war years (1986). This finding suggests that the frequency of strikes rather than the volume constitutes the best measure of the strike variable. Furthermore the final analysis did not find any substantial difference in terms of statistical significance between variables when either lagged or un-lagged, an issue that also informs the model laid out in the subsequent chapter. Alongside these important observations regarding strike variable measurements, this paper clearly highlights the importance of incorporating thorough controls for both macroeconomic factors and institutional factors into any model, it furthermore highlights the importance of periodising data into appropriate historical periods marked by distinctly different relationships between capital and labour.

Amongst the very few papers to examine the strike-wage and union-wage relationship in the post-accord period is the paper by Wallace, Leicht and Rafflovich (1999). Making use of quarterly aggregate data, the paper examines the changing impact of union membership and strike activity on employment, compensation and net revenue, during a time period periodised into that of a peak-, transition-, and post-accord America (Wallace et al, 1999). While the paper corroborates previous findings on the relationship between unions and wages for the period of the labour-capital accord it differs markedly in its conclusions regarding the impact of strikes. On the one hand the paper finds that unions positively redistribute income from capitalists throughout the period of the accord but not following its demise (Wallace et al, 1999). On the other hand the paper finds no evidence for a positive relationship between strikes and wages at any point in the post-war period, arguing that strikes in the early post-war period decreased company profits and that this economic cost was offset onto workers, and that during the period of transition strikes were directed more at noneconomic objectives (Wallace et al, 1999). Following the breakdown of the accord strikes, according to the authors, became very rare and largely defensive and therefore essentially irrelevant for wage determination. Whilst constituting an admirable effort to examine an important phenomena while faced with severe data limitations the paper does possess a number of quite serious limitations. First, due to the high level of aggregation and the papers focus on the economy as a whole, the authors measure compensation as the total compensation of all employees, thereby failing to differentiate along class lines, clearly distorting the results and findings (Wallace et al, 1999). Second, due to severe limitations to the post-1979 strike data and due to the desire to use quarterly data and thereby increase the level of observations the authors chose to measure strikes only as the percentage of working time lost to strikes (Wallace et al, 1999). As Rubin had previously established this variable is not a satisfactory measurement of the impact of strikes, having been already proven to produce no significant statistical significance. The use of the percent time lost due to strikes conflates two different aspects of strikes, namely their size and frequency, and this, coupled with the very high level of

aggregation and the failure to differentiate between industries means that the findings should be treated with scepticism.

The most significant contribution made to the literature examining the impact of strikes on wage determination in the period following the breakdown of the labour-capital accord is that of Rosenfeld (2006). It is furthermore the paper, in terms of analytical approach and methodology that made the greatest contribution, alongside that of Rubin to the present study. The paper makes a very useful contribution to the problems surrounding data limitations for strikes in the post-accord period, one that circumvents both the limited and biased post-1979 Bureau of Labor Statistics data (which only collects data on strikes over 1000 workers) and the highly limited and problematic CPS data used by Wallace et al. Rosenfeld instead uses the case data from the FMCS to build a data series for the years 1984-2002, an approach adopted also in the present paper (Rosenfeld, 2006). Rosenfeld uses this data to calculate the strike frequency of non-managerial workers for different industry-regions and to calculate measures of strike severity, namely the average size, intra-firm and geographical proximity of strikes and the duration of strikes, the last of which presents an apparent problem that will be discussed in the following chapter (2006). The paper is unique in the sense that it not only presents samples for both highly unionised and low unionised areas of the economy, but also divides the economy into selected broad industry categories, such as mining, transportation and retail trade (Rosenfeld, 2006). Even more uniquely the paper includes other covariates that could affect workers' pay, such as race, gender, age and levels of education (Rosenfeld, 2006). In terms of the union-wage relationship the paper finds that the union coefficient appears significant suggesting that, despite the fall in union membership throughout the period unionisation continued to positively determine wages (Rosenfeld, 2006). Whereas in terms of the strike-wage relationship the model suggests not only that there is no positive impact on workers' wages but even suggests that strikes may in fact lower wages in the post-accord period (Rosenfeld, 2006). Nevertheless, as Rosenfeld points out, this apparent effect could be the result of strikes being concentrated amongst firms already experiencing wage losses brought about by other factors, with the broad industry categories proving unable to clearly show this (Rosenfeld, 2006). The results furthermore clearly corroborate the findings of Rubin in highlighting that no positive relationship between strikes and wages exists in low union density industries (Rosenfeld, 2006). Using a full variety of strike measures for both high and low union density areas, industries and regions, the paper finds no significant influence on workers' pay whatsoever (Rosenfeld, 2006). The paper furthermore tests whether strikes continue to decrease intra-industry and regional differentials in worker wages, finding that while greater unionisation does appear to positively impact upon differentials, strikes, even in high union density industry-regions, do not do so and perhaps even increase wage differentials in a negative manner (Rosenfeld, 2006). The results presented in the paper therefore strongly suggest that while unionisation in the post-accord period continues to positively influence wages and serves to narrow pay dispersion strikes do not do so, strongly suggesting that since the demise of the labour-capital accord there has occurred a complete decoupling of the strike-wage relationship. While the study is extremely thorough two potential problems with it can be identified, first, the industry categories used by Rosenfeld remain broad, encompassing industries in which workers have different levels of structural

and associational power and second, the author appears to have misunderstood one detail of the FMCS data, leading to one of secondary strike variables being essentially useless. Rosenfeld appears to have conflated the start and end dates presented in the FMCS reports and the start and end dates of the strikes themselves. Closer examination of these dates highlight that this simply cannot be the case, with some very small strikes apparently going on for several years. The present author has confirmed from the FMCS that these dates actually mark the length of time that an individual FMCS case file was open, meaning that while in some instances they do roughly relate to the length of the strike in question in other cases they certainly do not. Furthermore, while the paper theorises that the objectives of strikes may have moved away from the achievement of higher wages in recent decades, no evidence is used to substantiate this point.

The literature discussed above would appear to indicate a number of significant findings for this study. First, that for the period of the labour-capital accord strikes possessed a positive determination on wages in the automotive industry and second that following the breakdown of the accord a complete decoupling of this relationship occurred with strikes exerting no or even negative pressures on wages in the post-accord period. These outcomes are however far from certain. It could well be that for the automotive industry, an industry that has maintained an unusually high level of union density strikes may have maintained a statistically significant relation to wages. Alternatively while the strike-wage relationship may indeed have decoupled following the breakdown of the accord strikes may continue to prove successful in the achievement of other objectives beyond those of merely improved remuneration. In order to test these hypotheses a methodology will need to be employed that employs not only properly constructed econometric testing, but also qualitative data on the objectives and outcomes of strikes in the automotive industry. The model developed and the data used in order to meet these objectives will be the topic of the next chapter.

## Chapter 3. Data and Methodological Approach: Measuring Strikes in America

The data used in this analysis was derived from a number of different sources, albeit largely from US government sources. All data used constitutes annual observations of the US between the years 1946 and 2002, except where otherwise specified. All automotive industry related data drawn from the Bureau of Labor Statistics (BLS), refers to the three-digit SIC industry classification code 371 for the sub-industry ‘Motor Vehicles and Motor Vehicle Equipment’, the exact specifications of how this industry is defined are presented in Appendix A. The SIC classification system was abandoned in 2003 and a new NAICS classification system adopted, providing even more detailed sub-industry classifications. Following the abandonment of the SIC classification system the data previously collected under SIC code 371 was sub-divided under smaller classifications and combined with other data previously covered by different SIC codes, making it impossible to match up a consistent data series after 2002. This change to the classification system therefore limited the overall data available making it impossible to construct a time series beyond 2002. Beginning with a discussion of the problems associated with gathering consistent time series data for the strike variables in post-accord America and problems related to gathering industry specific unionisation data in general the following section shall present a discussion of the data sources. This will be followed by a discussion of the methodology employed in the final test. In all cases the section will provide analysis of the perceived limitations of both the data and the methodology.

### **Measuring automotive industry strikes in post-accord America**

As has been highlighted in the previous literature examining the strike-wage relationship, severe data limitations exist for data following 1979 (Rosenfeld, 2006, Wallace et al, 1999). The Bureau of Labor Statistics published annual reports entitled ‘Work Stoppages Caused by Labor Management Disputes’ from 1936 until 1979. These reports were exceptionally detailed, providing data on work stoppages at the national, regional, and industry level. Scanned versions of the original reports were provided by the BLS Work Stoppages department and the relevant data transcribed. Despite innumerable changes to the content of these reports they nevertheless provide consistent work stoppage data for all three-digit SIC codes. The author was therefore able to use the data contained in these reports to produce a consistent 1946-1979 data series of the annual strike frequency and the annual percentage of the production and non-supervisory workforce involved in work stoppages in a given year at the industry level. It should be noted that while SIC 371 ‘Motor Vehicles and Motor Vehicle Equipment’ broadly tallies with what would colloquially be referred to as the automotive industry, i.e. the production of parts and the assemblage of all highway non-military vehicles, it nevertheless excludes some firms that would likely otherwise be included in this industry, such as firms manufacturing vehicular lighting equipment, storage batteries and those manufacturing automobile glass and windshields, while these omissions are regrettable, they

are nevertheless unavoidable and furthermore unlikely to have distorted the final data to any significant degree. For an exact set of definitions on what does and does not fall under this industry classification please consult Appendix A. It should also be noted, for future researchers on this topic that these BLS reports do contain detailed information for the reasons for strikes, i.e. wages, job security and so forth, a source that has been to date chronically underutilised, with Wallace (1989) constituting a rare exception. This data is however only presented by industry-group, with data available for the industry-group 'Transportation Equipment' but not for the sub-industry 'Motor Vehicles and Motor Vehicle Equipment.' Owing to the fact that this industry-group encompasses four other sub-industries, including 'Aircraft and parts' and 'Ship and boat building', industries clearly unconnected to the automotive industry, it was deemed to not constitute an accurate proxy and the data was therefore not used for the purposes of this paper.

All of this changed following the 1980 election of Ronald Reagan, whose hostility to all things associated with the labour movement seemingly extended to government research. The budget for the Bureau of Labor Statistics was savagely cut, with the workforce employed in the Bureau of Labor Statistics Work Stoppages department falling by 80% (Rosenfeld, 2006). Faced with such limited resources for gathering data the Bureau of Labor Statistics began to only gather data on work stoppages involving 1000 or more workers and no longer published the data in anywhere like the level of detail previously available. As Rosenfeld has highlighted strikes involving more than 1000 workers constitute less than 10% of strikes overall, making the data of very limited use to anyone investigating issues related to strikes in post-1979 America (2006). These limitations on data have contributed to a precipitous decline in the output of academic studies on strikes in post-accord America. Of the limited literature that does exist for the period several different approaches have been employed. In her study of strikes and unionisation in post-World War II America Morris simply used the biased BLS data, accepting the limitations involved (2003). While it may indeed be possible to gather meaningful results on an aggregate level with such data it is clearly not a feasible data source for studies concentrating on individual industries, as the data loss would heavily distort the results. As previously discussed, Wallace, Leicht and Raffalovich attempted to circumvent the limitations of the BLS data by using data drawn from the BLS Current Population Survey, published in the Monthly Labor Review, to calculate the percentage of person-idle days due to strikes (1999). Nevertheless for the reasons highlighted in the previous section this data is equally problematic as a measure of strikes and liable to produce unreliable results (Rubin, 1986).

Therefore in order to avoid the problems inherent in both data sources this paper adopted an approach similar to that pioneered by Rosenfeld in utilising data provided by the FMCS (2006). Established in 1947 as part of the Taft-Hartley Act to provide mediation services for the private sector the FMCS has recently published a data set listing all the cases of labour-capital disputes brought to the FMCS from mid-1983 to 2014. The data drawn from the FMCS is, in many respects very rich, it provides the location of the work stoppage, the name and local number of the union involved, the year in which the work stoppage began, the number of workers rendered idle by the work stoppage and the name of the employer.



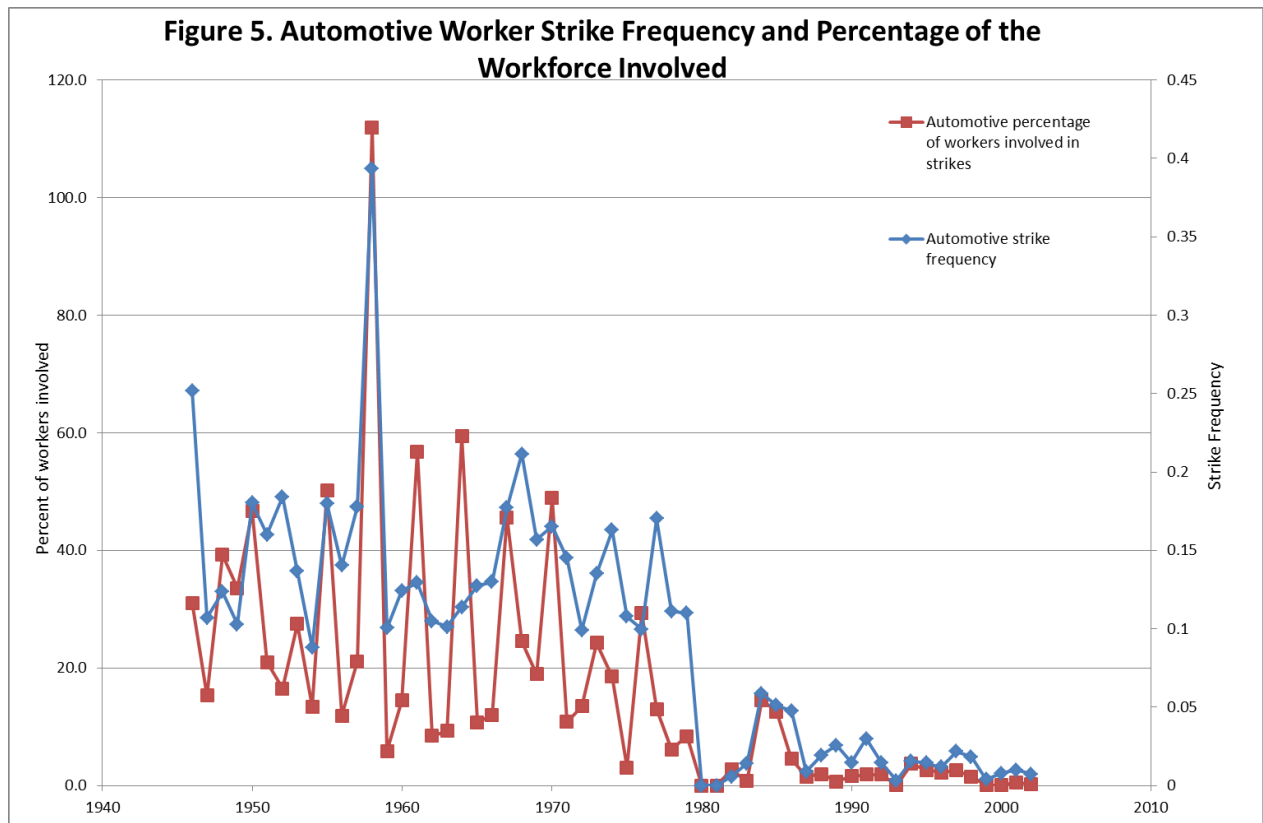
Nevertheless there are a number of problems with the data. The purpose of the FMCS data is not primarily to record work stoppages, but rather to record the FMCS' involvement in each work stoppage, this means that the start and end dates provided in the FMCS data do not in all cases directly correspond to the length of the work stoppage itself, rather they show the period of time in which each case was open, which in certain instances was a period of several years. This means that neither average strike duration nor the number of person-idle days can be extrapolated from the data. However for the reasons already outlined neither of these can be considered reliable strike measurements for the purposes of econometric analysis. The remaining data does however allow one to reliably calculate both the gross number of work stoppages beginning in each year and the number of workers involved, a set of data that is consistent with that provided in the annual work stoppage reports published by the Bureau of Labor Statistics prior to 1979. Another potential problem with the FMCS data is that it excludes all, so called 'wildcat strikes', i.e. strikes unauthorised by the union. While data cited by Rosenfeld suggests that in 1980 the percentage of wildcat strikes made up only 13% on an aggregate level, down from nearly two thirds in the 1930s, it is unclear what percentage of strikes in the automotive industry were wildcat strikes (2006). A third problem with the data provided by the FMCS is that the industry classifications given do not correspond with the BLS SIC code system, rather categories are given in broad terms such as 'construction', 'manufacturing' and 'retail trade'. This broad classification system proved unproblematic for Rosenfeld's data series but does present problems for the current paper.

In order to address this issue the data was mapped to exclude unwanted data. First, the data was mapped to exclude all work stoppages in which the UAW was not the union involved. The remaining data however includes many firms that fell outside of the definitions of 'Motor Vehicles and Equipment'; therefore in order to make the data series as consistent as possible the remaining data was manually processed, excluding those work stoppages that did not meet the definition of SIC 371. This approach presented a further set of problems for the study. Many of the firms listed had either merged with larger firms, changed their name, or in some instances, gone out of business altogether. While for the majority of the firms it was fairly straightforward to establish what they primarily produced and whether they met the definition criteria of SIC 371 in other cases this proved more difficult. A consistent and definitive way in which to deal with these problems could not be found. Many of the companies were still in operation and therefore had websites with pages on the history of the company and their current products. In other cases the author checked the names of the companies on various internet directories, the most useful of which was Bloomberg's company profile pages, this website generally gave details of past name changes and mergers and clearly outlined what each firm produced and for what industries. In the minority of cases however no information could be found via these Internet directories. In these instances the author sought information through a combination of approaches including searching for any mention of the name of the company in articles listed in JSTOR and LUB Search, searching for references to the company in old newspaper articles and even, in some cases, information was even gleaned from the obituaries of former employees. These combined approaches enabled the classification of almost all the companies listed into those that did and did not meet the BLS industry definition criteria. In the very rare instances in which no details

whatsoever could be found the work stoppages were simply removed from the time series. While this approach may have contributed to a small number of work stoppages being wrongly included and a small number of work stoppages wrongly excluded the author remains confident that these exclusions and inclusions, if they indeed exist, are extremely minimal and not significant enough to distort the final data. This approach was used to create a work stoppage time series for mid-1983-2014. However due to the lack of continuity between the BLS SIC and NAICS classification systems and the need for additional industry specific data, it was not possible to undertake regressions after 2002.

The manipulation of the FMCS data in the manner described nevertheless left the time series incomplete for both 1982 and 1983. To avoid gaps in the data and make the final time series as consistent as possible the data was completed using unpublished data for the years 1982 and 1983 provided by the BLS. This approach does however leave us with two years for which absolutely no data could be found whatsoever, namely 1980 and 1981. These omissions are regrettable, yet they are nonetheless unavoidable at the present time. Finally, when comparing the data drawn from the FMCS data with a time series of major strikes at General Motors, Ford and Chrysler assembly plants provided by the Education Department of the UAW it became clear that the FMCS data, whilst being clearly very comprehensive overall does omit a number of large and significant strikes in the automotive industry. A fully satisfactory explanation for why this has occurred could not be authoritatively established, however the evidence indicates that these strikes do not appear in the FMCS data series because normally, at the major assembly plants, the employer negotiated directly with the UAW without the assistance of the FMCS, resulting in no case being logged. If this supposition is correct it would suggest that the additional data provided by the UAW contributes all or most of the omitted data. In order to make the data as comprehensive as possible these additional strikes were entered into the time series. While the author is confident this procedure has led to few if any work stoppages being omitted, it should nevertheless serve as a source of caution for those researchers making use of the FMCS data in the future. The final data set displaying the two strike variables used can be found in Figure 5.

Finally, an important qualification should be made regarding both the data drawn from the BLS and from the FMCS. While this paper, in line with previous literature, has chosen to use the term 'strike' when referring to the data it should be clearly understood that no US source on strikes, aside from those specifically constructed by researchers, differentiates between strikes and lockouts (Rosenfeld, 2006). The 'work stoppage' data drawn from the BLS and the FMCS therefore undoubtedly includes multiple examples of lockouts rather than strikes, a conflation that undoubtedly leads to a distortion of the final data, albeit a distortion in line with that experienced by almost all prior research in this area.

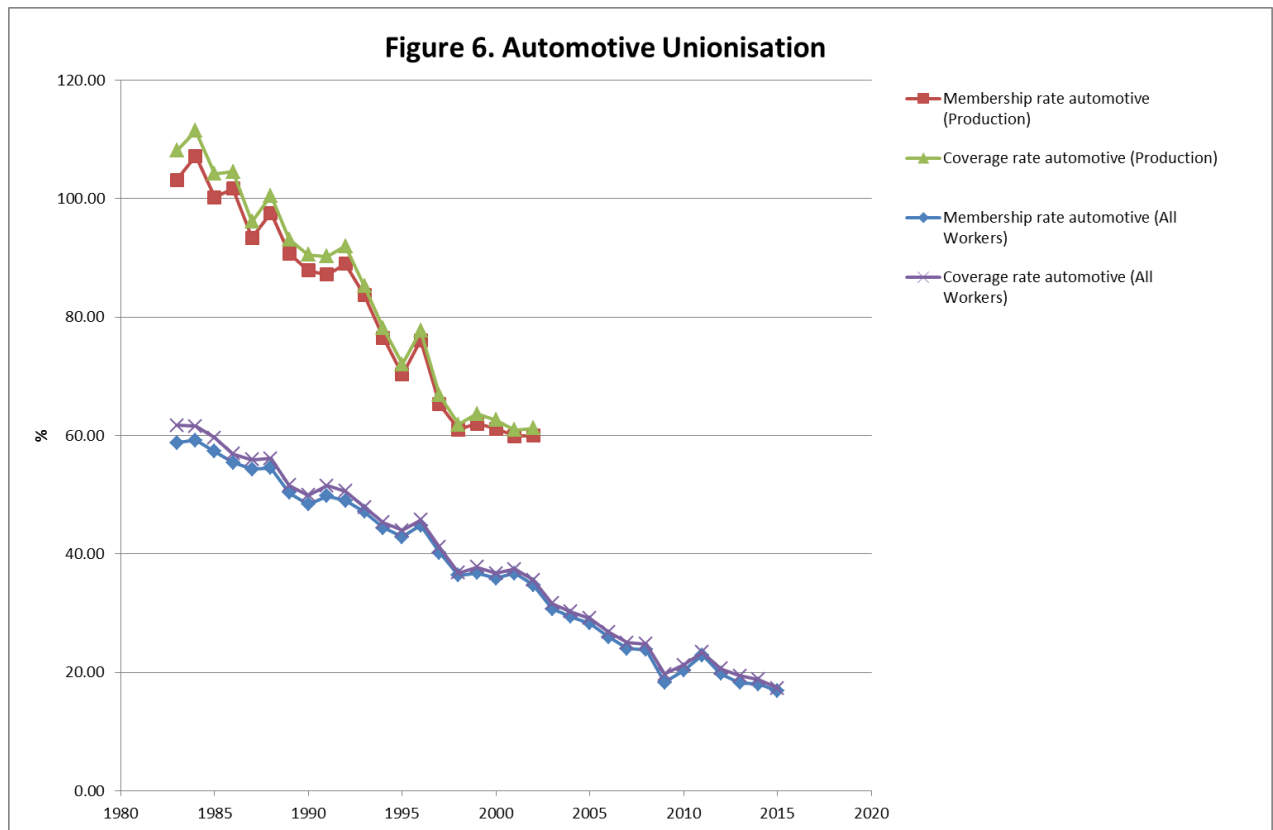


**Figure 5. Automotive Worker Strike Frequency and Percentage of the Workforce Involved.** Strike Variables: showing percentage of workforce involved in a work stoppage and frequency of strikes per thousand workers Source: BLS, FMCS, UAW, CPS-MORG file.

### Unionisation data limitations

An arguably even more significant limitation to the data used in this study is the data available on unionisation. Previous research dealing with unionisation in the pre-accord and early-accord period has drawn on a number of different sources in order to construct historical unionisation time series, including the original research of Lewis (1963), the annual Statistical Abstracts of the United States and the National Income and Product Accounts of the United States reports. However while some of these statistical sources do provide data for broad industry categories such as ‘manufacturing’, ‘construction’ and ‘transportation’ none of them provide detailed data on any sub-industry category comparable to that of the BLS category ‘Motor Vehicles and Motor Vehicle Equipment’ (Freeman & Medoff, 1984, Rubin, 1986, Goldfield, 1987). More recent studies, covering the late or ‘transitional’ period of the labour-capital accord and the period after the end of the accord generally draw their data from the BLS Current Population Survey (CPS). While the CPS survey provided a question on unionisation from 1973 onward it did not produce detailed sub-industry data but only data for broader industry categories (Rosenfeld, 2014). Only after 1983 did the CPS survey provide data on a level detailed enough to be of use to the current study, this data was not readily accessible via the CPS-MORG database and was therefore drawn from the detailed presentations of the data drawn from the CPS published by Hirsch & Macpherson (2003). It was initially hoped that more detailed data could be gathered via the UAW; however on

contacting the UAW it was found that the union does not have available membership data before the 1980s. While a survey of the historical literature and the authors request for information from the UAW Education Department on levels of unionisation prior to the early 1980s makes it clear that unionisation levels amongst auto assembly workers at Ford, Chrysler and General Motors was near 100% between 1946 and the early 1980s and very high amongst auto parts manufacturers, no consistent figures could be found (Pencavel & Hartsog, 1984). It is furthermore clear from the historical literature that the breakdown of union membership arose mainly in the 1980s with both the breakdown of the accord and the establishment of foreign owned plants (Goldfield, 1987). Nevertheless, this assumption does not help with the creation of a time series, as regressions cannot be run with stationary figures. Further problems were encountered when using the available post 1983 data drawn from Hirsch & Macpherson to create variables (2003). The data drawn from Hirsch & Macpherson calculates both union membership and the percentage of the workforce covered by a collective bargaining agreement based on the total number of wage and salary workers working in the 'Motor Vehicles and Motor Vehicle Equipment' industry (2003). Whereas the variables used in this paper are calculated based on the number of production and non-supervisory workers employed in the 'Motor Vehicle and Motor Vehicle Equipment' industry. This approach is both intuitively sensible, for it is production workers, rather than managers, accountants, secretaries and so forth who primarily engage in labour struggles and it is furthermore consistent with the approach employed in much of the previous literature (Rubin, 1986). Nevertheless when the author used the membership and coverage numbers provided by Hirsch & Macpherson to calculate variables for production and nonsupervisory workers using data drawn from the BLS CPS-MORG file it was found that the membership and coverage for some years exceeds 100% appearing as, for example 107.22% membership and 111.5% coverage for 1984 compared to 59.2% and 61.6% based on the entire workforce. This discrepancy is puzzling in the sense that Hirsch & Macpherson's data is drawn from a BLS survey that categorised workers from the outset based on SIC code. It cannot therefore be explained by the fact that the UAW had, in the 1980s expanded its organising beyond the auto industry. The discrepancy could in part be accounted for based on the assumption that some low level management and workers in the industry not directly employed in production were members of the UAW, or else may be accounted for simply due to the sample size of the CPS survey. Due to this discrepancy both data sets from 1983 onwards were used in the final regressions and no unionisation data prior to this was used. Due to the overall limitations of the UAW unionisation data unionisation variables were included only for the regressions covering the period 1983-2002. A visualisation of these two unionisation data sets can be seen in Figure 6.

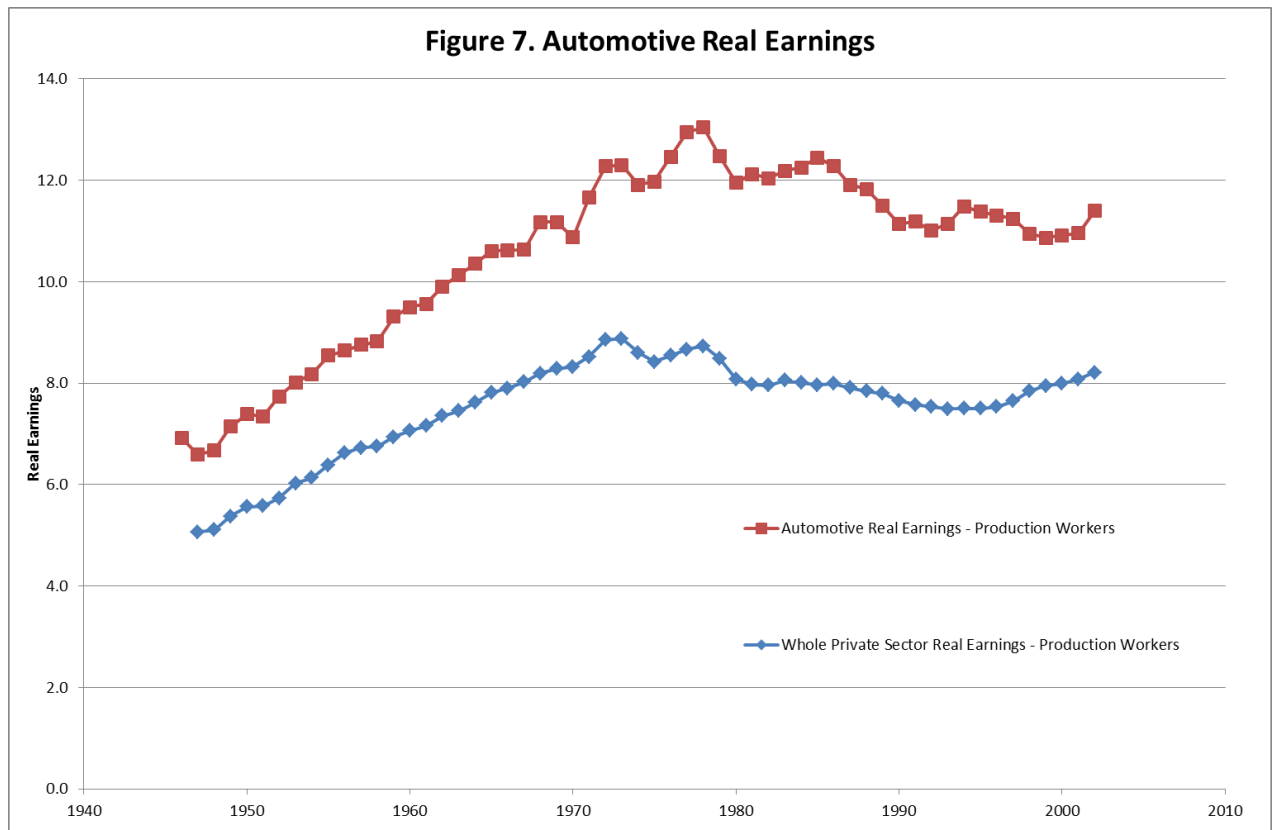


**Figure 6. Automotive Unionisation.** Automotive industry unionisation variables Source: Hirsch & Macpherson, 2016.

### Dependent Variable

The dependent variable used consistently for all regressions was average annual hourly real earnings of production and nonsupervisory workers in the ‘Motor Vehicles and Motor Vehicle Equipment’ industry. While, as Rosenfeld highlights, use of CES earnings data may prove problematic in the sense that the earnings data might not be representative for all workers involved in strikes, this is less problematic for the current paper than it might be for more aggregate studies, in the sense that this study looks at earnings and strike data for one specific sub-industry, and furthermore, for much of the accord period wages were set by national contracts (2006, 2014). The use of hourly earnings data is consistent with the approach employed by Rubin (1986). While it might be supposed that hourly real earnings would fluctuate with changes in hours worked, it should be understood that this measurement constitutes hourly takings from a monthly pay package, beside which, as Steigerwald points out, hours worked per week by auto workers remained fairly static throughout the period of study (2010). The CES hourly earnings data was gathered through monthly questionnaires sent to employers that gathered total payroll and total hours worked for different sections of the labour force, rather than hourly wages as such, thereby controlling for fluctuations in hours worked over time. Furthermore this approach to data gathering controls not only for changes in the basic hourly and incentive wage rates, but also for such variable factors as premium pay for overtime and late-shift work and changes in output of employers paid on an incentive plan. This approach also controls for shifts in the number of employees between relatively high-paid and low-paid work and changes in employees’ earnings in individual

establishments. Finally it should be noted that the CES MORG file is the only consistent source for national wage data on an industry level. These figures were drawn from annual averages calculated based on the average hourly earnings of production and nonsupervisory workers for the 'Motor Vehicles and Motor Vehicle Equipment' industry drawn from the BLS CES-MORG file, these nominal earnings were then adjusted for inflation using the CPI data drawn from the BLS. A visualisation of these real earnings figures set against those of private sector production workers as a whole can be found in Figure 7.



**Figure 7. Automotive Worker Real Earnings.** Showing real earnings from 1946-2002 for both production workers in the automotive industry and production workers in the private sector as a whole Source: CES-MORG BLS

## Independent Variables

In contrast to most recent literature on the topic the current study employs two different strike variables. Rosenfeld uses strike frequency calculated as the number of strikes occurring in a given year, region or industry divided by the corresponding total number of non-professional and non-supervisory workers and Rubin calculates strike frequency as the number of strikes per thousand non-agricultural workers (2006, 1986). This paper calculated the strike frequency per thousand for the industry in question as the frequency of strikes beginning in a given year divided by the number of non-supervisory and production workers and multiplied by a thousand. In addition another variable: the percentage of the workforce involved in strikes in a given year was also used. This additional variable was added as it appears to have been underused in the literature and could intuitively present interesting results. The numbers of strikes and the number of workers involved in the industry under examination for 1946-

1979 were drawn from transcriptions made from scanned copies of the ‘Work Stoppages Caused by Labor Management Disputes’ obtained via special request from the BLS. Whereas the data for the period 1982-3 was drawn from unpublished data spread sheets provided by the BLS and the data from 1984-2002 were gathered from the FMCS data files in the manner described above. The number of production and non-supervisory workers were taken from the BLS CPS-MORG file.

### **Unionisation Variables**

Owing to the reasons explained above no unionisation data was included prior to 1983. All subsequent data was drawn from Hirsch & Macpherson (2003) whose data was in turn derived from detailed breakdowns of the CPS survey unavailable via the BLS. Due to the discrepancy with the figures explained above four unionisation variables were included, one for the percentage of the production and non-supervisory workforce who were members of a union labelled ‘Union member (Worker)’, one for the percentage of the production and non-supervisory workforce covered by a collective bargaining agreement labelled ‘Union CB (Worker)’, one for the percentage of all wage and salary workers who were members of a union labelled ‘Union member (All)’ and one for the percent of all wage and salary workers who were covered by a collective bargaining agreement labelled ‘Union CB (All)’. All workforce data was drawn from the BLS CPS-MORG file.

### **Macroeconomic Variables**

In line with the approach adopted by all recent literature on strikes, unions and wages a range of macroeconomic control variables were incorporated into the model (Rubin, 1986, Morris, 2003, 253, Rosenfeld, 2006). These include GDP per capita, the unemployment rate and inflation. GDP per capita was calculated in 1990 GK\$ and was drawn from Angus Maddison’s widely cited figures (Bolt & van Zanden, 2014). Inflation was included as the measure of growth in the CPI and was taken from the BLS MORG files. The unemployment rate for 1948-2002 was calculated as the percent of individuals over the age of 16 registered unemployed and was gathered from the CPS MORG file, the unemployment rate for 1946-1947 was calculated as the percent of individuals over the age of 14 registered unemployed and was gathered from the Statistical Abstracts of the United States 1947 and 1948 which were transcribed from scanned documents taken from the website of the US Census Bureau.

### **Institutional Variables**

While the necessity for controlling for shifts in both the legal framework covering labour-capital relations and the political composition of government institutions in terms of their relative attitude toward workers’ rights and organised labour is widely discussed in the literature a number of different mechanisms for measuring this are employed. While Flanagan (1976) controls for Nixon’s wage policies and Farber & Western (2002) control for the composition of the National Labour Relations Board (NLRB), Rubin (1986) includes a series of dummy variables for each of the major pieces of legislation shaping labour-capital

relations. This study follows closely the approach utilised by Morris by controlling for both the political composition of the US House of Representatives and the political party of the US president in a given year (2003). Two institutional variables were therefore calculated, the first, consists of the percentage of seats taken by Democrats in the House of Representatives and a dummy variable where 1 signifies a Democratic Party president in a given year and where 0 signifies a Republican Party president in a given year, labelled 'President (Dummy)'. In every case bar that of Richard Nixon (who was impeached) US presidents left the White House in January, meaning that the year beginning in January is assigned the value of the incoming president, in the case of Richard Nixon, who left office on August 9 1974 the year is marked Republican as Nixon served for the majority of the year. Given organised labour's traditionally close relations with the Democratic Party an assumption was made that conditions for organised labour would be preferable under a Democrat president, furthermore the percentage of seats won in the House of Representatives was chosen over seats won in Congress overall based on previous studies that have argued that the House of Representatives is more representative than the Senate, labelled '%HOR' (McCammon, 1993). Both sets of data were drawn from the Election Statistics reports accessible via the website of the US Office of the Clerk. These institutional measures were deemed preferable to those used by other authors for a number of reasons, first they would appear to encompass not only the potential political bias of different government appointed bodies such as the FMCS and the NLRB but also the political bias of the population (including both workers and employers) at large. Furthermore, while Rubin's approach is commendable in several respects it appears inappropriate for the present study, in the sense that, except for the passing of Taft-Hartley 1947 and Landrum-Griffin 1959 most of the major legal changes occurred prior to the present period of study, furthermore it appears from the secondary literature that following the passage of these bills the labour-capital legislative landscape remained remarkably consistent throughout the period with the collapse of the accord being more reflected in changes in the composition of government bodies such as the FMCS and NLRB, shifts in general governmental attitudes toward labour, as signified by Reagan's hardline on the PATCO strike, and an intensification of attacks by employers within an increasingly flexibly enforced legislative climate.

### **Qualitative Data**

Several of the scholars examining the relationship between strikes and wages in the post accord period have hypothesised that concurrent with the decoupling of wages from measures of labour militancy there has been a move away from strikes over wages toward strikes around fringe benefits and job security (Rosenfeld, 2006, Wallace et al, 1999, Rosenfeld, 2014). Nevertheless this hypothesis has not to date been tested. While no comprehensive data series on the objectives and outcomes of strikes since 1979 exist, this study has uncovered one previously unused set of data that provides some insight into these issues. The UAW themselves compiled a record of strikes at the main Ford, Chrysler and General Motors assembly plants for the period of 1967-2007. The data for the time line was drawn from the BLS, newspaper clippings and the UAW's insurance department records. While the data cannot be used for quantitative analysis due to its inconsistent record of the strikes, with



certain strikes being labelled only as ‘national’ or ‘multi-state’ it does provide the date, duration, location and numbers of workers involved and, most importantly, it provides a short summary of both the motivation and the outcome of each strike. In order to render this data useable for the current paper the information provided for each strike was logged under strike motivation. Seven categories were chosen for this purpose: wages/benefits, organisation/production standards, job security, working conditions/health and safety, unfair dismissal and retirement provisions. Most strikes listed constitute one work stoppage and could be easily logged, other strikes, namely those listed as national, various, or multi-state proved more difficult. In some instances information about the approximate number of strikes can be gleaned from the summary, in other cases this was not possible. In these instances a rule of thumb was used, with 50 work stoppages constituting a national strike. The categories chosen were based on the information provided in the document, in many cases the strikes described involved more than one objective, however a satisfactory way of logging this could not be found. This led to some over simplifications of the data. While it would have been desirable to differentiate strikes motivated by wage increases and strikes motivated by fringe benefit increases, this was not possible, as in practically every strike motivated by fringe benefits; wages were also at stake and vice versa. It was furthermore originally hoped that the data could be clearly logged in such a way so that the percentage of successful/unsuccessful strikes could be traced over time, however it was found that the majority of the strikes appeared, based on the data provided to have been successful in meeting their objectives and that those that were not fully successful ended in a compromise wherein a proportion of the objectives were met. Caution should be expressed when examining this data for two reasons, first both the interpretation given by the author of the time line and the interpretation taken by the reader are naturally subjective, furthermore it is clear that, while the data appears to comprehensively reflect the events at the main assembly plants during the period, they are not representative of the automotive industry as a whole as defined in this study. The data gathered was then organised into a bar chart. The findings drawn from this source will be discussed in the following section.

## **Methodology**

The methodology employed in this study was a multivariate time-series regression model. Simple linear regressions were undertaken for the whole period 1946-2002 then for the sub-periods corresponding to this papers chosen definition of the period of labour-capital accord, 1946-1980, and the period following the breakdown of the labour-capital accord, 1981-2002, using first the strike frequency per 1000 workers and then the percentage of the workforce involved in strikes for a given year. Building on the discussions found in the literature this approach was then repeated using a one year lag for the two strike variables, leading to a loss of data of one year on all time periods. The incorporation of a set of regressions using lagged independent variables was based on the observation made by Rosenfeld that the immediate impact of strikes is likely detrimental to wages, with potential beneficial outcomes only being measurable for the following year, meaning unlagged strike activity would be liable to capture both the wage loss due to the strike as well as any potential gain (2014). Rosenfeld provides further justification in his 2006 paper, arguing that the lagged measure controls for

endogeneity issues (247). It should be noted however that in studies in which both lagged and unlagged regressions were undertaken the outcomes were of little to no statistical significance (Rubin, 1986, Wallace et al, 1999). Prior to running the regressions all variables besides the dummy variable were converted into logarithms in order to stabilise the variables and reduce variance. Next, an augmented Dicky-Fueller test was undertaken to test each variable for stationarity. Only the unionisation and the GDP variable were found to be non-stationary, these variables were differenced in order to achieve stationarity. All analyses were run using the econometrics software STATA.

## Chapter 4. Findings & Discussion

### Initial Results

Table 1 displays the full initial results for both the whole period of study 1946-2002 and for the two sub-periods, 1946-1980 and 1981-2002. Table 2 follows the same pattern except with the addition of a one-year lag for both of the strike variables (leading to the loss of an initial year of data). Specifications 1, 3 and 5 in both Tables focuses on strike frequency for the whole period and the two sub-periods, 1946-1980 and 1981-2002. Specification 2, 4 and 6 for both Tables focuses on the percentage of the workforce involved in a strike, for the whole period and for the two sub-periods, 1946-1980 and 1981-2002.

The measure of fit as expressed by the R-squared appears to be consistently high for all specifications, albeit lower for those samples based on a higher level of observations, as is to be expected. Furthermore, the coefficient for the inflation appears at a consistently very high level of statistical significance, with the coefficient positively significant for the whole period and the period of accord, but negative for the post-accord era. Regarding the strike variables two main observations can be made. First that the strike frequency appears to be the best measure for testing the relationship between strikes and wages, this interpretation can be drawn from the fact that, for the specifications covering the full time series, the coefficients of strike frequency display high statistical significance, and that the R-squared is also higher in specification 1 suggesting a higher level of overall fit. Furthermore for the specifications covering the full period of observation the institutional variable covering the number of seats taken in the US House of Representatives shows statistical significance, for specifications 1 in both Tables it appears positive and significant and in specifications 2 for Table 1 it appears highly statistically significant whereas for specification 2 in the Table 2 it appears only significant. This discrepancy could be accounted for by the better measurability of strike effects expressed by strike frequency and the higher level of fit in specification 1 in both Figures. The unionisation variables appear only to be significant in specification 6, with union density based only on production workers seemingly exerting a significant negative impact, the percentage of production workers covered by a union contract exerting a very slight positive significance, the union density of all pay-roll employees expressing some statistical significance and the percentage of all pay-roll workers covered by a collective bargaining agreement exerting some negative statistical significance. Seemingly contradictory results.

A very different picture is presented when one examines the specifications in the two Tables covering the two sub-periods. Here, in both the lagged and un-lagged Tables, none of the strike variables display any statistical significance whatsoever. Taken in isolation this could indeed suggest that for the industry analysed strikes did not exert a significant statistical influence on wages. However given the fact that specification 1 in both Tables does show high positive statistical significance and this specification is based on a higher set of observations, this interpretation would seem to be misleading. While it is indeed possible

that, for the period after the breakdown of the accord there was a total decoupling of the strike wage relationship, one would expect, both based on the literature and based on the high level of statistical significance in specification 1 to find corresponding statistical significance for the variable in one or both of the sub-periods. Without reliable results for either of the two sets of sub-period samples the question as to if and when a decoupling between strikes and wages occurred remains open. These inconclusive results suggest that the number of observations contained in the specifications covering the two sub-periods are simply too low to generate meaningful results. While the annual nature of the pre-1979 data series makes it impossible to increase the number of observations, this is not the case for the data gathered by the author for the period following 1981. All the data sources used to gather the post-accord data include roughly accurate start dates for the work stoppage information. Therefore in order to address the limitations of the initial results a second set of regressions were undertaken, this time using quarterly data for the period of 1982-2002. The methodology employed and the findings gained are discussed below.

Table 1. Unlagged Determinants of Real Earnings

VARIABLES	1946-2002		1946-1980		1981-2002	
	[1]	[2]	[3]	[4]	[5]	[6]
Strike Frequency	0.0837*** █ (0.027)		0.0162 █ (0.0489)		-0.00432 █ (0.00684)	
% Workers in Strikes		0.0227** █ (0.0111)		-0.000555 █ (0.0189)		-0.00584 █ (0.00342)
Unemployment	0.0769 █ (0.101)	0.0262 █ (0.114)	-0.0324 █ (0.116)	-0.0405 █ (0.11)	0.0262 █ (0.0415)	0.0368 █ (0.0344)
Union Member (Worker)	13.24 █ (21.19)	-0.597 █ (17.15)			-4.206 █ (3.077)	-4.889** █ (2.193)
Union CB (Worker)	-13.18 █ (21.07)	0.592 █ (17.06)			4.148 █ (3.046)	4.804* █ (2.164)
Union Member (All)	-14.68 █ (18.98)	-1.14 █ (15.35)			4.374 █ (2.829)	4.993** █ (1.961)
Union CB (All)	14.85 █ (18.78)	1.345 █ (15.16)			-4.379 █ (2.816)	-4.970** █ (1.949)
Inflation	0.289*** █ (0.0467)	0.223*** █ (0.0419)	0.515*** █ (0.073)	0.513*** █ (0.0765)	-0.266*** █ (0.0751)	-0.299*** █ (0.0775)
GDP	1.162 █ (0.824)	1.367 █ (0.866)	1.041 █ (0.65)	1.01 █ (0.607)	0.331 █ (0.356)	0.341 █ (0.347)
% HOR	0.447** █ (0.189)	0.585*** █ (0.207)	0.274 █ (0.269)	0.288 █ (0.25)	-0.303*** █ (0.09)	-0.357*** █ (0.0862)
President (Dummy)	-0.0232 █ (0.0285)	-0.0354 █ (0.0351)	-0.0538* █ (0.0315)	-0.0550* █ (0.0315)	-0.0348** █ (0.0139)	-0.0376*** █ (0.00948)
Constant	-0.539 -0.682	-1.022 -0.804	-0.562 -0.92	-0.631 -0.8	4.898*** -0.755	5.279*** -0.756
Observations	54	54	33	33	21	21
R-squared	0.73	0.681	0.827	0.827	0.926	0.938

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 1. Unlagged Determinants of Real Earnings.** Showing the regressions of the unlagged determinants of annual real earnings for non-supervisory production workers in the US automotive industry, for the period 1946-2002 and the sub-periods 1946-1980 and 1982-2002.

Table 2. Lagged Determinants of Real Earnings

VARIABLES	1946-2002		1946-1980		1981-2002	
	[1]	[2]	[3]	[4]	[5]	[6]
LAGGED						
Strike	0.0794***		-0.00736		-0.000607	
Frequency	█ (0.0284)		█ (0.0548)		█ (0.00567)	
LAGGED %						
Workers in		0.0187		0.001		0.00128
Strikes		█ (0.0131)		█ (0.0238)		█ (0.0022)
Unemployment	0.0752	0.0637	-0.0682	-0.065	0.0234	0.0236
t	█ (0.0994)	█ (0.11)	█ (0.116)	█ (0.111)	█ (0.0391)	█ (0.0404)
Union						
Member	-6.663	-0.378			-2.301	-1.964
(Worker)	█ (13.37)	█ (16.74)			█ (3.315)	█ (3.166)
Union CB	6.715	0.344			2.295	1.961
(Worker)	█ (13.4)	█ (16.68)			█ (3.303)	█ (3.155)
Union	4.264	-1.418			2.699	2.368
Member (All)	█ (13.03)	█ (15.24)			█ (3.003)	█ (2.868)
Union CB	-4.182	1.716			-2.711	-2.384
(All)	█ (13.03)	█ (15.12)			█ (2.997)	█ (2.858)
Inflation	0.277***	0.209***	0.471***	0.472***	-0.321***	-0.312***
	█ (0.0494)	█ (0.0384)	█ (0.0594)	█ (0.0645)	█ (0.0839)	█ (0.0881)
GDP	1.603*	1.398	1.155	1.170*	-0.214	-0.182
	█ (0.804)	█ (0.872)	█ (0.694)	█ (0.646)	█ (0.39)	█ (0.393)
% HOR	0.405**	0.518**	0.410*	0.408	-0.344***	-0.342***
	█ (0.192)	█ (0.207)	█ (0.239)	█ (0.245)	█ (0.0953)	█ (0.0952)
President	-0.0243	-0.0338	-0.0699**	-0.0688**	-0.0235	-0.0243
(Dummy)	█ (0.0289)	█ (0.0349)	█ (0.0307)	█ (0.0323)	█ (0.0171)	█ (0.0172)
Constant	-0.345	-0.751	-0.947	-0.939	5.364***	5.312***
	-0.692	-0.747	-0.807	-0.767	-0.769	-0.807
Observations	54	54	34	34	20	20
R-squared	0.712	0.666	0.82	0.82	0.938	0.939

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 2. Lagged Determinants of Real Earnings.** Showing the regressions of the lagged determinants of annual real earnings for non-supervisory production workers in the US automotive industry, for the period 1946-2002 and the sub-periods 1946-1980 and 1982-2002.

## Quarterly Data Analysis

With the aim of addressing the shortcomings of the regression outcomes discussed above a quarterly time series was constructed for the years 1982-2002. The years containing missing data, i.e. 1980-1981 were emitted entirely. Quarterly data for the strike variables was gathered based on the number of work stoppages and the number of workers involved starting in each quarter with the frequency and the percentage of involvement calculated in relation to the number of production and non-supervisory workers employed in the industry under analysis for averages over the corresponding three months. Real earnings were constructed through trimonthly nominal wage averages adjusted by a corresponding average of the CPI with the CPI index being rebased to 2002=100. Unemployment was included as an average of the percent of workers unemployed for each quarter weighted by the number of workers. Annual GDP figures drawn from Maddison were used for all quarters. Owing to the date of both US presidential elections and House of Representative elections (January and November respectively) the institutional variable values remained unchanged. Due to the relative infrequency of strikes in the automotive industry during the post accord period 11 cells of the quarterly strike variable data remained blank out of a total of 84, a total of 13%. In accordance with the approach undertaken in the initial results both an un-lagged and lagged set of regressions were undertaken. Based on the outcomes for the initial findings that show statistical significance for the coefficient of strike frequency overall but not for the two sub periods two hypotheses were outlined:

Hypothesis 1. The quarterly data for the post-accord period highlights no statistical significance for the strike variables, suggesting that the strike-wage relationship existed only in the period of labour-capital accord.

Hypothesis 2. The quarterly data for the post-accord period highlights statistical significance for the strike variables, suggesting that the strike-wage relationship was maintained after the breakdown of the accord.

While it is also possible that the strike-wage relationship did not occur prior to the breakdown of the accord, this outcome was deemed, based on the literature, extremely unlikely and was therefore discounted.

Table 3. Quarterly Unlagged and Lagged Determinants of Real Earnings, 1982-2002

VARIABLES	UNLAGGED		LAGGED	
	[1]	[2]	[3]	[4]
Strike Frequency	0.00227 (0.0029)		LAGGED Strike Frequency	0.00804*** (0.00243)
% Workers in Strikes		0.000745 (0.0013)	LAGGED % Workers in Strikes	0.00105 (0.000993)
Unemployment	-0.11 (0.0662)	-0.111 (0.0695)	Unemployment	-0.168** (0.0679)
Union Member (Worker)	-4.647 (3.997)	-5.052 (3.825)	Union Member (Worker)	-3.92 (3.657)
Union CB (Worker)	4.602 (3.973)	5.008 (3.801)	Union CB (Worker)	3.807 (3.588)
Union Member (All)	5.42 (3.702)	5.903* (3.499)	Union Member (All)	5.174 (3.577)
Union CB (All)	-5.5 (3.689)	-5.992* (3.482)	Union CB (All)	-5.182 (3.472)
Inflation	-0.194*** (0.0317)	-0.195*** (0.0316)	Inflation	-0.165*** (0.0309)
GDP	-0.124 (0.162)	-0.154 (0.156)	GDP	-0.0869 (0.128)
% HOR	-0.378*** (0.0715)	-0.379*** (0.0709)	% HOR	-0.380*** (0.0477)
President (Dummy)	-0.0407*** (0.0149)	-0.0416*** (0.0151)	President (Dummy)	-0.0449*** (0.012)
Constant	5.371*** -0.374	5.374*** -0.371	Constant	5.287*** -0.258
Observations	73	73	Observations	72
R-squared	0.699	0.698	R-squared	0.76

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3. Quarterly Unlagged and Lagged Determinants of Real Earnings.** Showing regressions of quarterly unlagged and lagged determinants for non-supervisory production workers in the US automotive industry, for the period 1982-2002.

### Quarterly Data Findings

Table 3 displays 4 specifications all based on the quarterly data described above. Specifications 1 and 3 focus on strike frequency as the main independent variable under observation, whereas specifications 2 and 4 focus on the percentage of the workforce involved in strikes as the main variable of observation. With specifications 3 and 4 being lagged by one year. The findings for the quarterly 1982-2002 sample are consistent with the annual samples discussed above in a number of ways. The percentage of workers involved in strikes shows no statistical significance in either the un-lagged or lagged regressions, reinforcing the suggestion made earlier that it is not a reliable measure of the impact of strikes. Furthermore the institutional variable for the percentage of seats taken by the Democratic Party in the House of Representatives also appears consistently statistically significant, however here (as in the specifications for the sub-period 1981-2002 in the annual sample) the coefficients appear consistently negative in value. Similarly inflation remains statistically significant but negative, again this supports the findings found in the annual regressions. In variation to the annual sample, which showed no statistical significance for the presidential dummy variable, the quarterly data shows a consistently high negative statistical significance for all specifications.



The fundamentally different finding established through the quarterly data however is found in the coefficients for strike frequency. While in the un-lagged specification for the strike frequency coefficient displays no statistical significance in the lagged sample it displays a high level of statistical significance. A finding that will be discussed below.

### Qualitative Data

The information drawn from the UAW timeline on strikes in the major Ford, General Motors and Chrysler assembly plants is displayed in Figure 8. The findings drawn from this visualisation suggest an absolute disappearance of strikes motivated by wage increases and benefit improvement, with such demands making up the overwhelming majority of strikes prior to 1986. Following this, demands shift toward issues regarding health and safety and job security. While it should be noted that the results for the accord period are in some respects distorted by the existence of several national strikes over wages and benefits, this pattern, a shift away from wage demands to demands over conditions and jobs is maintained.

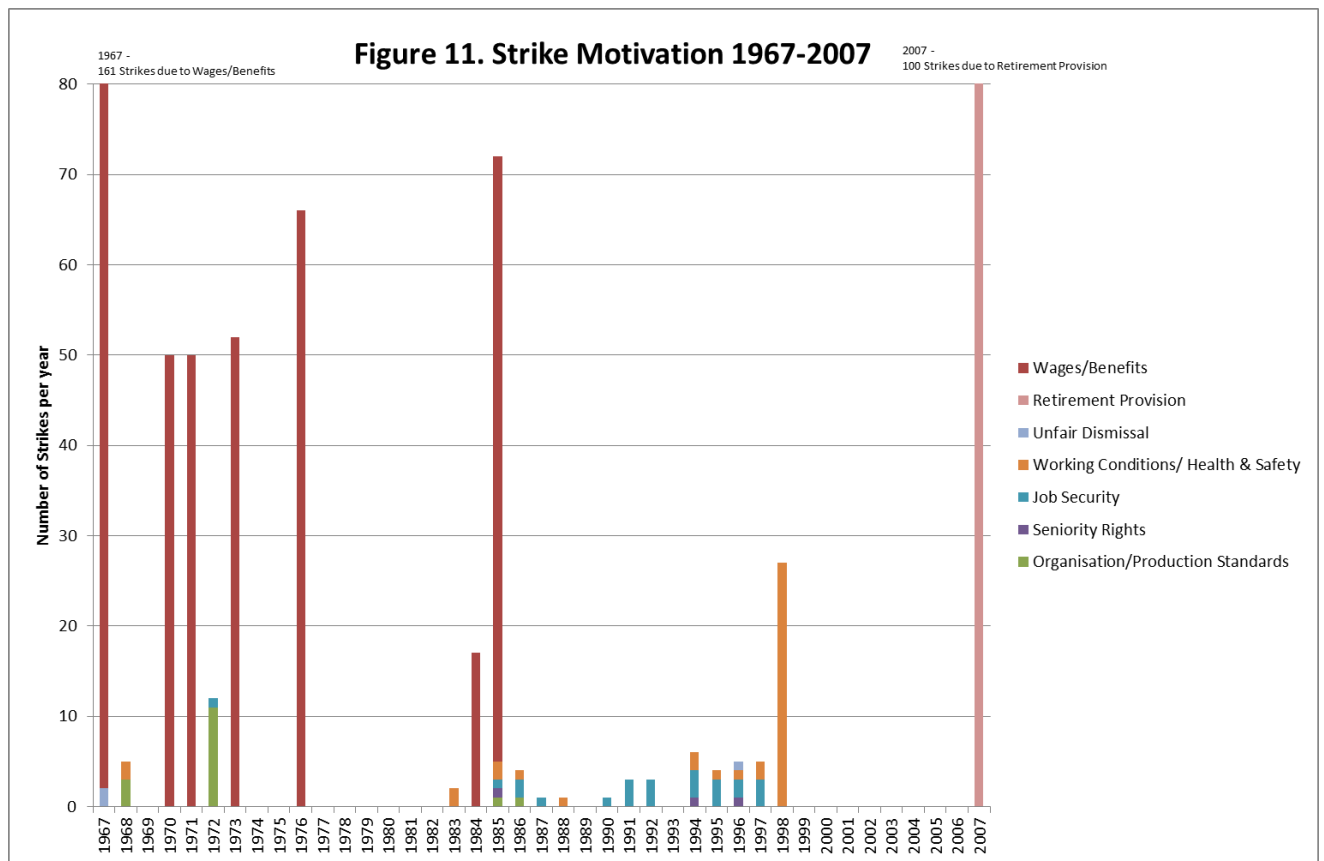


Figure 8. Strike Motivation 1967-2007. Strike motivation 1967-2007 Source: UAW.

## Chapter 5. Discussion and Conclusions

### Discussion

Taken together the findings gathered from both the annual and the quarterly regressions and the qualitative data appear to present a very interesting picture of the relationship between strikes and wage determination. The regressions undertaken for the annual data for the whole period suggest that overall strike frequency exerts a positive statistically significant impact on real earnings. Nevertheless these findings were not reflected in the regressions undertaken for either of the annual sub-periods. This seemingly illogical discrepancy can be explained by the very small number of observations in each periodised sample, with the number of observations being too low to garner meaningful results. The quarterly regression analysis, undertaken to rectify this issue produced some very intriguing and somewhat surprising results. It highlighted that for the period following the breakdown of the accord strike frequency maintained a high positive statistical significance for real earnings with the impact emerging only after a lag of one year. The discovery of evidence for a lagged positive relationship supports the argument made by Rosenfeld that strikes initially depress wages for workers, with positive gains only being reaped after a year (2006, 2014). Nevertheless the finding of a statistically significant positive relationship between strike frequency and real earnings directly contradicts the findings of every other study on the strike-wage relationship in post-accord America. Furthermore this finding is apparently contradicted by the qualitative data drawn from the UAW which strongly suggests that the objectives of strikes has, over the past decades fundamentally changed, with a complete shift away from struggles over wages and benefits.

How are we to interpret these findings? It should be recognised that the qualitative data drawn from the UAW is not necessarily representative of the majority of strikes covered in this paper, most of which, in the post-accord period, occurred away from the major assembly plants in smaller factories employed in the production of motor vehicle equipment and parts and the findings drawn from it are in no way authoritative. However, if its findings are indeed representative of a dramatic move away from the use of the strike to win higher wages, this need not necessarily contradict the findings. It could be for example that strikes continue to exert a positive impact on wages irrespective of the motivation of the strikers. To flesh this assertion out a little further; it could be that expressions of militancy amongst automotive workers put pressure on employers to maintain or increase wages, as a means to try to maintain future social peace. In terms of the apparent contradiction between these findings and the hypotheses drawn from the literature it could be that the level of aggregation employed in all previous studies, including the much more refined study by Rosenfeld, homogenised workers to the extent that the positive strike-wage relationship maintained by some groups of workers was concealed from the final results. This finding remains however, troubling, in the sense that they defy almost all expectations previously established. The findings are furthermore left somewhat inconclusive due to the failure to detect any statistical

significance for strike frequency for the sub-period of the labour capital accord. Furthermore the lack of any detectable impact on earnings from the different measures of unionisation appears puzzling and calls into question the overall results. While the literature and the general consensus regarding the history of the UAW would strongly suggest that there was indeed a positive strike relationship between 1946-1980 it must be clearly stated that this study has not brought forth any authoritative evidence to support this hypothesis. Nevertheless it would appear, based on everything we know, extremely surprising if, with the breakdown of the labour-capital accord UAW workers alone suddenly began to exert, through very infrequent strikes, a positive impact on wage determination. The author therefore maintains that it is more likely that there was a positive relationship between strikes and wages in the automotive industry during the accord period, while the level of this influence for the period of the labour-capital accord is unclear, and that this relationship was maintained into the period following the breakdown of the accord. The author also maintains that the evidence provided highlight the need to potentially rethink the relationship between strike motivation and wage determination, while previous studies have suggested that successful strikes motivated by wage increases constitute the means through which strikes pressure wages this assumption may in fact be ill founded. It should be clearly stated that these findings are preliminary, but as such they highlight the need for further research on a number of aspects highlighted by the study. First, further research should be undertaken on the motivation of strikes, their outcomes and the impact on wages. The evidence exists in order to pursue this line of research; with the pre-1979 annual BLS Work Stoppage reports providing detailed breakdowns for work stoppage motivations for industry-groups. Furthermore, the FMCS data could be mapped by industry in order to create matching time series in the manner undertaken in this paper, with data on motivations being gathered through newspaper archives or union documents. Second, more authoritative research could be undertaken on the relationship between strikes in the automotive industry, through the linking of the FMCS data to wages at the firm level.

The second set of intriguing results gathered from the analysis is that regarding the impact of institutional variables on wage determination. Both the annual regression analyses and the quarterly analyses highlight a strong statistical significance between earnings amongst production workers in the automotive industry and the percentage of seats won by the Democratic party in the House of Representatives, a finding that seemingly contradicts that of other studies in the literature (Morris, 2003). Furthermore for the period of 1946-1980 the findings drawn from the regressions suggest a high positive relationship, whereas after 1980 they reflect a high negative relationship. How are we to interpret this evidence? During the period 1946-1980 the average number of seats won by Democrats in the House of Representatives was 58.2% whereas from 1981-2002 this figure was 54.8%. This could indeed suggest a positive relationship between the level of Democrats in government, but given the fairly small average difference between the figures this argument is far from fully convincing. Nevertheless following the early 1980s Big Labor's once close relationship and influence over the Democratic Party broke down, suggesting that this division could relate more closely to the broader conditions of the labour-capital accord and the breakdown of the institutional influences of the labour movement (Rosenfeld, 2014). While this finding is

intriguing it remains preliminary and further research concentrated specifically on this relationship would be required in order to establish more authoritative results.

## **Conclusions**

How then has the data analysed contributed to the answering of the original research question? The evidence gained from the analysis suggests that there was indeed a positive relationship between strikes and wages in the US automotive industry in the post-WWII period. Contrary to the original expectations however this relationship does not appear to have been definitively severed by the breakdown of the labour-capital accord. Rather this relationship appears to have been maintained even in the face of declining union membership and the decline of the industry itself. While evidence was gathered for the overall period and for the period after the breakdown of the accord, no authoritative evidence was established to show that strikes positively influenced wage determination during the period of the accord itself. Nevertheless, it appears, based on previous literature, and based on the supposition that it is extremely unlikely that automotive workers exerted a greater level of power over wage determination after the breakdown of the accord that this relationship did exist between 1946 and 1981 and that, therefore a positive relationship between strikes and wages was maintained throughout the period of study. These findings contradict the previous research and suggest the possibility that groups of workers in specific industries may have maintained a positive strike-wage relationship, with this impact having been previously concealed due to issues of aggregation. These findings, coupled with the observations made from the qualitative data and the literature furthermore suggest the possibility of a more indirect relationship between strike motivation and wage determination.

## Bibliography

- Adkins, L.C. & Carter Hill, R. (2008). *Using Stata For Principles of Econometrics*, Third Edition, John Wiley & Sons, Inc: Hoboken, NJ
- Armstrong, P. Glyn, A. & Harrison, J. (1984). *Capitalism Since 1945*, London: Fortana
- Ashenfelter, O.C. Johnson, G.E. & Pencavel, J.H. (1972). Trade Unions and the Rate of Change of Money Wages in United States Manufacturing Industry, *Review of Economic Studies*, pp.27-54
- Bennett, J.T. & Kaufman, B.E. (2007). *What Do Unions Do?: A Twenty-Year Perspective*, Transaction Publishers: New Jersey
- Bolt, J. and J. L. van Zanden (2014). The Maddison Project: collaborative research on historical national accounts, *The Economic History Review*, 67 (3), pp.627–651
- Becker, B.E. & Olson, C.A. (1986). The Impact of Strikes on Shareholder Equity, *Industrial and Labor Relations Review*, April 1986, 39 (3), pp.425-438
- Brenner, R. (2006). *The Economics of Global Turbulence: The Advanced Capitalist Economies from Long Boom to Long Downturn, 1945-2005*, Verso Press: London
- Burkitt, B. & Bowers, D. (1976). Wage Inflation and Union Power in the United Kingdom: 1949-1967, *Applied Economics*, 8, pp.289-300
- Card, D. (1998). *Falling Union Membership and Rising Wage Inequality: What's the Connection?* NBER Working Paper 6520, National Bureau of Economic Research, Cambridge, MA
- Cramton, P. & Tracy, J. (1992). Strikes and Holdouts in Wage Bargaining: Theory and Data, *American Economic Review*, 82, pp.100-21
- Cramton, P. & Tracy, J. (1998). The Use of Replacement Workers in Union Contract Negotiations: The U.S. Experience, 1980-1989, *Journal of Labor Economics*, 16, pp.667-701
- Dixon, M. & Roscigno, V.J. (2003). Status, Networks, and Social Movement Participation: The Case of Striking Workers, *American Journal of Sociology*, 108, pp.1292-327
- Eichengreen, B. (2007). *The European Economy Since 1945: Coordinated Capitalism and Beyond*, Princeton: Princeton University Press
- Farber, H.S. & Western, B. (2001). Accounting for the decline of unions in the private sector, 1973-1998, *Journal of Labor Research*, 22: 459-85
- Farber, H.S. & Western, B. (2002). Ronald Reagan and the Politics of Declining Union Organization, *British Journal of Industrial Relations*, 40, pp.385-401
- Flanagan, R. (1976). Wage Interdependence in Unionized Labor Markets, *Brookings Papers on Economic Activities*, 3, pp.635-81

- Freeman, R.B. & Medoff, J.L. (1984). *What Do Unions Do?* New York: Basic Books
- Garthman, D. (1986). *Auto Slavery: The Labor Process in the American Automobile Industry, 1897-1950.* Rutgers University Press.
- Hibbs, D. (1976). Industrial Conflict in Advanced Industrial Societies, *American Politician Science Review*, 70, pp.1033-1058
- Hogler, R.L. Hunt III H.G. & Weiler, S. (2015). Killing Unions with Culture: Institutions, Inequality, and the Effects of Labor's Decline in the United States, *Employ Respons Rights J* (2015), 27, pp.63-79
- Kuhn, P. (1998). Unions and the Economy: What We Know; What We Should Know, *Canadian Journal of Economics*, 31, pp.1033-56
- Goldfield, M. (1987). *The Decline of Organised Labor in the United States*, Chicago: Chicago University Press
- Goldfield, M. (1982). The Decline of Organized Labor: NLRB Union Certification Election Results, *Politics & Society*, 11(2), pp.167-209
- Goldfield, M. (1984). The Causes of U.S. Trade Union Decline and their Future Prospects, *Research in Political Economy*, 7, pp.81-159
- Harvey, D. (1999). *The Limits of Capital*, London: Verso
- Hirsch, B.T. & Macpherson, D. A. (2003). Union Membership and Coverage Database from the Current Population Survey: Note, *Industrial and Labor Relations Review*, Vol. 56, No. 2, January 2003, pp. 349-54
- Honey, M. (1999). *Black Workers Remember: Oral history of Segregation, Unionism, and the Freedom Struggle*, University of California Press: Berkley
- Kramer, J.K. & Vasconcellos, G.M. (1996). The Economic Effect of Strikes on the Shareholders of Nonstruck Competitors, *Industrial and Labor Relations Review*, January 1996, 49 (2), pp.213-222
- Lewis, G.E. (1963). *Unionism and Relative Wages in the United States: And Empirical Inquiry*, Chicago: University of Chicago Press
- Lewis, G.E. (1964). Relative Employment Effects of Unionism, In *Proceedings of the Sixteenth Annual Winter Meeting of the Industrial Relations Research Association*, ed. Gerald G. Somers, 1964
- Macpherson, D.A. (1990). Trade Unions and Labor's Share in U.S. Manufacturing Industries, *International Journal of Industrial Organization* 8, pp.143-151
- Martin, R. Sunley, P. & Wills, J. (1996). *Union Retreat and the Regions: The Shrinking Landscape of Organised Labour*, London and New York: Routledge

- Meier, A. & Rudwick, E. (2007). *Black Detroit and the Rise of the UAW*. University of Michigan Press.
- McCammom, H.J. (1993). From Repressive Intervention to Integrative Prevention: The US State's Legal Management of Labor Militancy, 1881-1978, *Social Forces*, 71 (3), 569-601
- Morris, T. (2003). Unionization Matters: An Analysis of Post-World War II Strikes, *Sociological Inquiry*, Vol. 73, No. 2, May 2003 pp.245-64
- Mitchell, D. (1980). *Unions, Wages, and Inflation*, Washington D.C.: The Bookings Institute
- Nelson, D. Amoako-Adu, B. & Smith, B. (1994). Impact of Labor Strikes on Equity Values: Canadian Evidence, *Journal of Economics and Business*, 1994, 46, pp.153-165
- Neumann, G.R. (1990). The Predictability of Strikes: Evidence from the Stock Market, *Industrial and Labor Relations Review*, July 1990, 33 (4), pp.535-535
- Olin Wright, E. (2000). Working-Class Power, Capitalist-Class Interests, and Class Compromise, *American Journal of Sociology*, Vol. 105, No.4, Jan, pp.957-1002
- Paldam, M. (1983). Industrial Conflicts and Economic Conditions: A Comparative Empirical Investigation, *European Economic Review*, 20, pp.231-56
- Pencavel, J. & Hartsog, C. (1984). A Reconsideration of the Effects of Unionism on Relative Wages and Employment in the United States, 1920-1980, *Journal of Labor Economics*, 2, pp.193-232
- Persons, O.S. (1995). The Effects of Automobile Strikes on the Stock Value of Steel Supplies, *Industrial and Labor Relations Review*, October 1995, 49 (1), pp.78-87
- Piketty, T. (2014). *Capital in the Twenty-First Century*, Harvard University Press: Boston Massachusetts
- Reder, M.W. (1965). Unions and Wages: The Problems of Measurement, *Journal of Political Economy* 73 (April 1965), pp.188-96
- Robinson, C. (1989). The Joint Determination of Union Status and Union Wage Effects, *Journal of Political Economy*, 97, pp.639-67
- Rosenfeld, J. (2014). *What Unions No Longer Do*, Harvard University Press: Cambridge, Massachusetts, London, England
- Rosenfeld, J. (2006). Desperate Measures: Strikes and Wages in Post-Accord America, *Social Forces*, Vol.85, No.1 (Sep., 2006), pp.235-265
- Ruback, R. & Zimmerman, M. (1984). Unionization and Profitability: Evidence from the Capital Market, *Journal of Political Economy*, 1984, 92, pp.1134-1157
- Rubin, B.A. (1986). Class Struggle American Style: Unions, Strikes, and Wages, *American Sociological Review*, October 1986, 92, pp.1134-1157

- Shalev, M. (1980). Trade Unionism and Economic Analysis: The Case of Industrial Conflict, *Journal of Labor Research*, Vol. 1, No. 1 (Spring), pp.133-74
- Shniad, M. (2010). The Decline of Organized Labour and How its Current Trajectory Can Be Reversed, *Labour/Le Travail*, 65 (Spring 2010), pp.141-148
- Steigerwald, D. (2010). Walter Reuther, the UAW, and the Dilemmas of Automation, *Labor History*, Vol. 51, No.3, August 2010, pp.429-453
- Stiglitz, J. (2013). *The Price of Inequality*, Penguin: London
- Swenson, P. (1989). *Fair Shares: Unions, Pay and Politics in Sweden and West Germany*, Cornell University Press
- Tournadre, F. & Villeval, M-C. (2004). Learning from Strikes, *Labour Economics*, 11, pp.243-264
- Tronti, M. (1965). The Strategy of Refusal, in, Lotringer, S. & Marazzi, C (eds.) (2007), *Autonomia: Post-Political Politics*, Los Angeles, CA: Semiotext(e), pp. 28-36
- Wallace, M. (1989). Aggressive Economism, Defensive Control: Contours of American Labour Militancy, 1947-1981, *Economic and Industrial Democracy*, 10:7, pp.7-34
- Wallace, M. Leicht, K.T. & Raffalovich, L.E. (1999). Unions, Strikes, and Labor's Share of Income: A Quarterly Analysis of the United States, 1949-1992, *Social Science Research*, 28, pp.265-88
- Weir, R.E. (2000). *Workers in America: A Historical Encyclopedia*, vol. I-II, ABC-CLIO: Santa Barbara, California, Denver, Colorado, Oxford, England.
- Young, A.T. (2010). One of the things we know that ain't so: Is US labor's share relatively stable?, *Journal of Macroeconomics*, 32, pp.90-102
- J.R. Zetka Jr. (1992). Wildcat Strikes in the U.S. Automobile Industry, 1946 to 1963, *American Sociological Review*, Vol. 57, No. 2 (Apr., 1992), pp.214-226



## Appendix A

The following definition of what constitutes the SIC code 371 was transcribed by the present author from a scanned document provided via special request from the BLS Work Stoppages department. Owing to copywrit restrictions the original page scans cannot be presented. The following information was derived from pages 234 and 235 of: ‘Standard Industrial Classification Manual, 1987, Executive Office of the President, Office of Management and Budget, United States of America.’ Any errors incurred through the process of transcription are entirely my own:

“Industry Group No. 371

Industry No. 3711

Motor Vehicles And Motor Vehicle Equipment

Motor Vehicle and Passenger Car Bodies

Establishments primarily engaged in manufacturing or assembling complete passenger automobiles, trucks, commercial cars and buses, and special purpose motor vehicles which are for highway use. This industry also includes establishments primarily engaged in manufacturing motor vehicle parts, bus establishments primarily engaged in manufacturing chassis and passenger car bodies. Such establishments may also manufacture motor vehicle parts, but establishments primarily engaged in manufacturing motor vehicle parts except chassis and passenger car bodies are classified in Industry 3714. Establishments primarily engaged in manufacturing truck and bus bodies and in assembling them on purchased chassis are classified in Industry 3713; those manufacturing motor homes on purchased chassis are classified in Industry 3716; those manufacturing motorcycles are classified in Industry 3751; those manufacturing industrial tractors are classified in Industry 3537; those manufacturing other wheel tractors, except contractors off-highway types, are classified in Industry 3523; those manufacturing trucklaying and contractors’ off-highway type tractors are classified in Industry 3531; those manufacturing combat tanks and self-propelled weapons are classified in Industry 3795; and those manufacturing stamped body parts for passenger cars are classified in Industry 3465.

Ambulance (motor vehicle)

Amphibious motor vehicles, except tanks

Assembling complete automobiles, trucks, commercial cars and buses

Automobiles

Bodies, passenger automobile

Brooms, powered (motor vehicles)

Car bodies, including fiberglass

Cars, armoured

Cars, electric, for highway use

Chassis, motor vehicle

Fire department vehicles (motor vehicles)

Flushers, street (motor vehicles)

Hearses (motor vehicles)

Mobile lounges (motor vehicle)

Motor buses, except trackless trolley

Motor homes, self contained

Motor trucks, except off-highway

Motor vehicles, including amphibian

Patrol wagons (motor vehicles)

Personnel carriers, for highway use

Road oilers (motor vehicles)

Snowplows (motor vehicles)

Station wagons (motor vehicles)

Street sprinklers and sweepers (motor vehicles)

Taxicabs

Tractors, truck: for highway use

Universal carriers, military

Industry Group No. 371

Industry No. 3713

Motor Vehicles and Motor Vehicle Equipment – Con.

## Truck and Bus Bodies

Establishments primarily engaged in manufacturing truck and bus bodies and cabs for sale separately or for assembly on purchased chassis, or in assembling truck and bus bodies on purchased chassis. Establishments primarily engaged in manufacturing complete trucks and buses are classified in Industry 3711; those manufacturing stamped body parts for trucks and buses are classified in Industry 3465; those manufacturing truck and trailers and demountable cargo containers are classified in Industry 3715; those manufacturing cabs for agricultural tractors are classified in Industry 3523; those manufacturing cabs for industrial trucks are classified in Industry 3537; and those manufacturing cabs off-highway construction trucks are classified in Industry 3531.

Ambulance bodies

Automobile wrecker-truck body

Bodies, dump

Bus bodies, motor vehicle

Hearse bodies

Truck beds

Truck bodies, motor vehicle

Truck cabs for motor vehicles

Truck tops

Van-type bodies, all purpose

## 3714 Motor Vehicle Parts and Accessories

Establishments primarily engaged in manufacturing motor vehicle parts and accessories, but not engaged in manufacturing complete motor vehicles or passenger car bodies. Establishments primarily engaged in manufacturing or assembling complete automobiles and trucks are classified in Industry 3711; those manufacturing tires and tubes are classified in Industry 3011; those manufacturing automobile glass are classified in Major Group 32; those manufacturing automobile stampings are classified in Industry 3465; those manufacturing vehicular lighting equipment are classified in Industry 3647; those manufacturing ignition systems are classified in Industry 3694; those manufacturing storage batteries are classified in Industry 3691; and those manufacturing carburetors, piston rings, and engine intake and exhaust valves are classified in Industry 3592.

Air brakes, motor vehicle

Automotive wiring harness sets, except ignition

Axle housings and shafts, motor vehicle

Axles, motor vehicle

Ball joints, motor vehicle

Bearings, motor vehicle: except ball and roller

Brake drums

Brakes and brake parts, motor vehicle

Bumpers and bumperettes, motor vehicle

Camshafts, motor vehicle gasoline engine

Cleaners, air: motor vehicle

Connecting rods, motor vehicle: gasoline engine

Control equipment, motor vehicle: acceleration mechanisms and governors

Crankshaft assemblies, motor vehicle: gasoline engine

Cylinder heads, motor vehicle: gasoline engines

Defrosters, motor vehicle

Differentials and parts, motor vehicle

Directional signals, motor vehicle

Drive shafts, motor vehicle

Dump-truck lifting mechanisms

Engines and parts, except diesel: motor vehicle

Exhaust systems and parts, motor vehicle

Fifth wheels

Filters: oil, fuel, and air – motor vehicle

Frames, motor vehicle

Fuel pumps, motor vehicle

Fuel systems and parts, motor vehicle

Gas tanks, motor vehicle

Gears, motor vehicle

Governors, motor vehicle

Heaters, motor vehicle

Hoods, motor vehicle

Horns, motor vehicle

Hydraulic fluid power pumps for automotive steering mechanisms

Instrument board assemblies, motor vehicle

Lubrication systems and parts, motor vehicle

Manifolds, motor vehicle: gasoline engine

Motor vehicle gasoline engine rebuilding on a factory basis

Motor vehicle parts and accessories, except motor vehicle stampings

Mufflers, exhaust: motor vehicle.”