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ABSTRACT

Evolution of Union Wages and Determinants

Labor unions, chiefly through collective organizing and bargaining, almost universally increase the wages of their members, even after controlling for individual, job, firm, and other characteristics that affect pay (Fang and Verma 2002). This earnings advantage of union workers is known as the union wage premium. The premium differs by country, industry, worker, and the estimated wage premium varies by study methodology, among other factors. This chapter explains the premium's determinants and charts how they have changed over time, leading to a typically reduced wage effect in recent years relative to decades past. Such changes include globalization, technological change and a rise in the skill premium, a shift toward the service industry, less favorable labor law, and possibly increased opposition toward unions. Methodological challenges and empirical techniques are reviewed, and premium estimates by country/region are presented. An average union wage premium of 0-20% is found based on recent research, with considerable variation depending on the methodology and country under study. The literature focuses on several developed countries, and is limited in a number of developing nations, with data availability being the primary reason. Results from the developing world exhibit more variation, but often fall in line with those from developed countries such as the United States.

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1: Introduction

What do unions do? Richard Freeman and James Medoff ventured to answer this question in their landmark book which bore the question as its title. They characterize unions as “the principal institution of workers in modern capitalistic societies” (1984, p. 3). Thus, the main task of unions is generally considered to be the improvement of wages and working conditions for their membership (Morin 2017; Rios-Avila and Hirsch 2014). Depending on the context in which they operate, unions around the globe place varying degrees of emphasis on improving their members’ labor market outcomes. In China, for example, unions’ primary concerns are motivated by government interests (Gunderson et al. 2016). Nevertheless, the effects of unions on worker outcomes have been a common topic of research inquiry. The notion that unionized workers earn more than comparable workers who are not covered by a union and collective bargaining agreement, a phenomenon typically known as the ‘union wage premium’, has received considerable attention in the literature. Reflecting the importance of unions, particularly their effects on workers, the literature on the union wage premium is one of the most extensive and long-standing in the history of labor economics (Blanchflower and Bryson 2010; Forth and Bryson 2019; Graham et al. 2018).

This chapter reviews the union wage premium literature, paying attention to how union wage differentials have evolved over time, as well as the factors that cause them. It is worth noting that wages are just one facet of the compensation package, but studies on unions’ impact on other facets are comparatively quite scarce (Forth and Bryson 2019; Zhang 2019). As this is a very prolific literature, wage effects will be emphasized, as will more recent studies from 2010 onwards to reflect the current state of research and more advanced research methodology.

The rest of this chapter is organized as follows. Section 2 commences with a review of key developments in the modern history of unionism to contextualize the topic. Section 3 outlines the sources or determinates of the union wage premium and the reasons why most recent studies agree that the premium has generally been decreasing over time. Section 4 begins with a review of the data and empirical issues encountered by union wage premium researchers, including the usual methods undertaken by them. Next, alternative wage premium methodologies are summarized, followed by recent findings of studies from select countries in both the developed and developing world. Section 5 offers policy and practice implications drawn from the preceding sections' findings. Section 6 highlights avenues for future research. Finally, section 7 summarizes the chapter.

2: The History of Unions and Their General Theoretic Foundations

Unions have been considered as common and progressive labor market institutions in the 21st century, but this was not always the case. The 1935 passage of the Wagner Act in the United States is often lauded as a landmark moment for unions. Prior to this legislation, Callaway and Collins (2018) explain that organized labor was mostly divided into occupational craft unions which had limited effectiveness. Employers had free rein to disregard collective bargaining and use a range of punitive tools to prevent unions from organizing, striking, and asserting their influence in general. The United Kingdom was one of the first countries to effectuate relatively modern union legislation, doing so in 1871 with the Trade Union Act, which formally recognized unions and granted them the right to strike (Curthoys 2004). This era's dominant craft unions were commonly reviled by the working class for entrenching the interests of their highly skilled members (Rutherford 2013). Craft unions were therefore by and large exclusionary

organizations. African American civil rights leaders near the turn of the nineteenth century such as Marcus Garvey, Booker T. Washington and Fredrick Douglass opposed the unions of the era for their maltreatment of African American workers (Williams 2011). Despite the resulting inequities, the economic rationale for these elitist tactics was easy to comprehend: given weak union institutions, it would be much more difficult for employers to substitute away from highly skilled and specialized workers compared to lower skill positions, which can be adequately filled by a substantially larger proportion of the labor force. Therefore, a group of exclusively highly skilled and specialized workers would have more leverage to exert union power and increase their wages, and a better chance at doing so by restricting their occupation's labor supply.

As legislation, society, and the realities of the labor market evolved, so did the structure of unions. With a general move away from craft unions toward more representative and integrated industrial unions in the years surrounding the Wagner Act's implementation, American organized labor began to live up to its modern depiction as a progressive institution seeking to achieve the common good for union members (Gomez and Lamb 2019). A consistently reported finding is that unions in developed countries compress the wage structure, raising the wages of those with lower skills relative to their higher skill counterparts (Blanchflower and Bryson 2004; Card 1996; Freeman and Medoff 1984; Graham et al. 2018). This fact, alongside the standardization of wages by unions, can reduce the impact of discrimination against marginalized groups in the labor market (Freeman 1980). Statistical evidence has usually supported the narrative that unions are relatively better at improving wages and other parts of employment contracts for racialized workers (Ashenfelter 1972; Hirsch and Addison 1986; Farber 1989; Lewis 1986). More recent evidence has cast some doubt on this, however. There is not necessarily a difference in the union wage premium for White and

racialized workers in the private sector (Rosenfeld and Kleykamp 2012), but Kerrissey and Meyers (2021) find a 2-3% greater union premium in the public sector for Black and female workers relative to Whites and males, respectively.

Shortly after the Wagner Act was passed, the unionization rate (the percentage of union members in the labor force) reached its absolute peak in the United States, hitting a high in the ballpark of 28% (Açıkgöz and Kaymak 2014) to 35% (Troy and Sheflin 1985) in the 1950's. The OECD (2021) shows a height of 30.9% union density in the United States, in 1960 (the first year of their data). Differences in the estimation of peak union membership foreshadow the data issues encountered when measuring union wage premia. As will be shown in section 3.2, union density, a proxy for union power, has direct implications for the union wage premium.

In the OECD's (2021) longitudinal dataset of trade union density by country, a third of the 18 countries which have data since 1960 saw their density reach its zenith in 1960 or 1961. These countries are Australia, Austria, Netherlands, Norway, Switzerland, and the United States. The next peak out of the 18 countries is Japan, in 1964, followed by France in roughly the early 1970's (several years are tied at 22.6% density). One more clear pattern emerges from the data for these 18 countries dating back to 1960: seven of them hit their highest union density on record between 1975 and 1983, with the caveat that Turkey is missing some datapoints. Three of these six countries (Italy, Ireland, and Germany) peaked in 1978, Turkey in 1975, the United Kingdom in 1980, Canada in 1982, and Denmark in 1983. 1993-1994 saw the pinnacle of union density in the Scandinavian countries of Finland and Sweden (Denmark, too, was near its peak in this era). Lastly, Belgium was the most union dense it has ever been in 2001. While there is not a singularly convergent pattern across all these data rich countries, demonstrating the

heterogeneity of unionism and labor policy across geographic regions, a downward trend is evident.

Another trend emerges when reviewing the six countries which experienced their highest union density in the early 1960's (OECD 2021). Three of them (Australia, Austria, and Norway) were among the five highest union densities in 1960; therefore, their early decline may be explained in part by diminished room for growth in the 1960-1980 period. Out of the other three countries, the United States, probably the most researched country in the union literature, has long been noted for union busting policies, such as the 1947 Taft-Hartley Act (Callaway and Collins 2018). Switzerland of the mid 20th century has been comparable to the United States in its less developed social welfare policies and trade unionism in contrast to other European countries (Trampusch 2010). Its labor policies continue to skew more heavily toward employers' interests relative to a country like Germany to this day (Emmenegger et al. 2020). Meanwhile, the Netherlands has always had low union membership (van der Meer et al. 2009). Bryson et al. (2011, p. 104) state that "what proved crucial in such cases [of "very significant reversals in union fortunes"] was a change in the direction of public policy." Moreover, from 1980 to 2008 the ranking of union density across European Union (EU) countries barely changed (Bryson et al. 2011). As such, it appears that entrenched institutions and norms, especially of the political variety, go a long way in explaining international differences in unionization.

A general tendency of declining union power and union wage premia has been identified from some point in the 1980's through the early 21st century. The trend has been noticeable in North America (Bilginsoy 2013; Callaway and Collins 2018; Fang and Verma 2002), but it was also seen in countries including Australia, the Netherlands, and the United Kingdom (Açıköz and Kaymak 2014). Diverging patterns are, however, evident in multiple countries. That being

said, union density is not necessarily directly correlated with union power. Italy saw its union density decline (OECD 2021), yet Açıkgöz and Kaymak (2014) aver that Italian unions were gaining strength near the close of the 20th century.

This historical overview begs the question: how do unions exert their power? To answer this question, it is instructive to first return to the work of Freeman and Medoff (1984). They conceptualized union power through two different lenses, namely, the monopoly face and the voice face. The monopoly face explains the bargaining power of unions through their traditional ability to organize significantly large swathes of workers, thereby granting them substantially more leverage than an individual worker, or small group of workers, could muster in a negotiation over wages or other aspects of working conditions. A recalcitrant employer can much more easily brush off isolated demands for improved standing in the employment relationship; however, when a union effectively gains monopoly control of the labor supply, it also gains the ability to radically alter, or even stop, an employer's operations by cutting the supply of labor. This face of unionism can therefore force employers to come to the bargaining table and make concessions. On the other hand, the voice face of unions serves to amplify and transmit the opinions and concerns of employees. The voice face can improve the communication between management and labor and improve working relationships, thereby reducing employee turnover. While the monopoly face may jeopardize enterprise productivity, the voice face, although its importance has been historically neglected, can enhance productivity (Fang and Heywood 2006).

Another way unions may cause wages to increase is by 'shocking' management into making changes to formalize and standardize its practices, thereby increasing productivity and resulting in wage gains (Slichter 1941). In addition to raising the wages of the workers which they cover, unions may also indirectly lead to wage increases for uncovered workers. This is

known as the threat effect (Freeman and Medoff 1981; Rosen 1969), as non-union employers may adopt some workplace improvements to deter union formation. According to Coombs et al. (2015), empirical studies find mixed results on the threat effect's impact on non-union wages, but appear to be mostly leaning positive.

To conclude this subsection, there are two issues worth noting. First, most of the relevant union theory is directly tied into the following subsection 3 on the determinants of the union wage premium, or in section 4.1 on empirical issues in union wage research methodologies. In the interest of brevity, many theoretical considerations will only be discussed in those sections. Second, as mentioned previously, unions affect a number of labor market outcomes, some of which are worth summarizing here. Unions have been found to increase non-wage benefits (Freeman 1981; Zhang 2019) such as medical insurance, pension plan coverage, and paid holiday leave. Some research suggests that unions' effect on benefits is relatively larger than their effect on wages (Forth and Bryson 2019; Freeman and Medoff 1984; Knepper 2020). They may also influence productivity (Fang et al. 2018) and increase unemployment for non-members (Morin 2017; Rios-Avila and Hirsch 2014) by restricting the supply of labor (Blanchflower and Bryson 2010) to enhance the wages of their members. This is just a brief review of the additional effects of unions. A larger review of this nature including union effects on firm outcomes such as productivity, profitability, investment, and plant closure is beyond the scope of this chapter. Increasing wages may come at the expense of other negative effects, as numerous interrelated variables are bargained over in the workplace.

3: The Union Wage Premium, Its Determinants, and Changes Over Time

This section will provide an overview of the factors which influence the magnitude of the union wage premium, and how they have changed over time. There is minimal change in what these factors are over time, but changes in the factors themselves can have significant impacts on the premium's magnitude.

3.1: Micro-level Factors

As mentioned in the previous section, individual characteristics can have an impact. Due to union wage compression, the premium is usually lower for those higher on the spectrum of skills, and for those who are married and more educated, proxies for greater productivity (Fang and Verma 2002). Kuhn and Sweetman (1998) find that displaced union workers with significant job tenure have especially large subsequent wage losses, indicating that there is a union wage premium for seniority (see also Addison et al. 2022). Identity characteristics such as ethnicity affect the union premium as well, with union tactics again tending to reduce wage inequalities experienced by more marginalized groups. Studies on union wage differentials by gender typically find a greater premium for women but are not unanimously in accord. Bryson et al. (2020) find generally greater premia for women, as do Kerrissey and Meyers (2021), specifically in the public sector; on the other hand, Campolieti (2018) traces out a decline in the premium for women relative to men over time. Canadian women are found to benefit from a 5-6% premium in the late 1990's, which erodes to 0-1% in the 2010's; the premium for men stays between 1-4% throughout this period. Earlier studies indicate the premium is greater for women (Oaxaca 1975; Parsley 1980). Intersectionality, that is to say identification with more than one marginalized community (usually used in the context of being both female and a racialized person; Crenshaw 1989), can have variegated effects on the union wage premium. Kerrissey and Meyers (2021) estimate a slightly larger premium for Black women than White women. An earlier study

contradicted this finding, estimating that White women benefit from a larger union wage premium than White men, yet non-White women receive the smallest premium (Wunnava and Peled 1999). Both Bryson et al. (2020) and Kerrissey and Meyers (2021) highlight the importance of institutional considerations when it comes to the premium by gender. The time period and country (Bryson et al. 2020) as well as the industry/sector (Kerrissey and Meyers 2021) affect the gender differences in the premium.

Since unions compress wages across the skill distribution, they are much less beneficial for highly skilled workers. Numerous studies actually find that unions decrease wages for very highly skilled workers (Cai and Waddoups 2011; Gomez and Lamb 2019; Zhang and Gunderson 2020). Frandsen's (2021) finding that higher paid and older workers have a greater tendency to leave recently unionized firms buttresses the wage compression hypothesis. The logic behind this is that unions usually represent the interests of the median member to satisfy a large enough swath of their membership, hence favoring lower wage workers (Pontusson 2013). Overall, their egalitarian wage practices (Açıkgöz and Kaymak 2014) can prevent highly paid workers from attaining wages as high as they otherwise could. Açıkgöz and Kaymak (2014) estimate that a rising skill premium – or wage return to higher skill levels – over time has accounted for 40% of de-unionization in the United States. By this narrative, highly skilled workers have been able to negotiate for increasingly higher wages over time when they are outside of the wage compressing constraints of unions. Exogenous changes in product markets or technology likely explain some of the skill premium increase (Açıkgöz and Kaymak 2014), but Peng and Kang (2013) underscore the plausibility of endogeneity in the unionization and skill premium relationship. Exploiting country-level differences in labor market institutions, they argue that the decline of unionization amongst low skill workers is the largest reason for the skill premium

increase over time. Other research, however, argues that technological change is the main driver (Açıkgöz and Kaymak 2014). The rise in the skill premium, whatever the dominant reason(s), has adversely impacted the union wage premium in two ways. First, it has directly lowered the average premium by reducing, or eliminating, the premium for workers above a certain skill level. Second, it has contributed to the de-unionization of skilled workers, therefore weakening union bargaining power.

3.2: Meso-level Factors

Following the discussion from the last section, greater union density is correlated with greater union wage premia (Coombs et al. 2015; Freeman and Medoff 1981; Lewis 1986). A critical mass of union density is necessary to have a significant wage impact (roughly 30% density) by ‘taking wages out of the competition’, whereas above a certain level (an estimated 70%) returns may even dip into the negative (Addison et al. 2022). The main reason for this is that with a higher rate of union membership the actions of a union can be much more extensive; for example, by threatening a full shutdown of operations through a strike (Addison et al. 2022). On top of union density, Wooden (2001) has shown that union activity matters as well. Unions whose senior delegate regularly spends time on union activities and holds regular meetings, including meetings with management, produce much larger wage premia. Wooden (2001) estimates that an inactive union produces a wage premium roughly half the size as a similar but highly active union. The proper approach undertaken by any given union should consider the industry/occupation(s) being organized (Parker and Rees 2013) as well as how the organizing methods will impact those of different backgrounds (Tapia et al. 2017). A greater wage premium would be expected when a union’s strategy is aligned with the context within which it operates. The wage premium also depends on the goals of the union, as some may opt for lower wages in

return for improvements in characteristics like job security or benefits (Gunderson and Hyatt 2001). Union members can in some contexts be assigned to higher paying job titles in collective agreements (Addison et al. 2022).

The trend of de-unionization, with fewer unionized workers as a share of the total labor force, has certainly contributed to declining union wage premia; Judzik and Sala (2013) estimate that de-unionization from 1980-2010 has prevented wages from increasing between 10-20% in countries ranging from the United States to the United Kingdom to Japan. However, de-unionization is probably both a symptom and a cause of the wage decline. Many of the other factors listed in this section have resulted in decreased union density, which has in turn had a downward effect on union wages. From the other side, factors such as product market competition and technological change, which have decreased the wage premium, have led workers to leave unions or refuse to join unionized firms at an increased rate. There is therefore two-way causality in the union wage and union density relationship.

Although workers in large firms make more on average, the union wage premium is generally larger in smaller firms (Benjamin et al. 2012; Lewis 1986; Waddoups 2008). There are two key theoretical reasons for this fact. Unions attempt to standardize wages across different workplace characteristics, hence reducing the wage gap between small and large organizations (the latter having greater average wages); moreover, union threat effects are greater for large organizations, which are usually easier and more fruitful to organize (Benjamin et al. 2012).

The industry of a firm can impact the union wage premium, even after controlling for other factors (Ashraf 1990; Bratsberg and Ragan 2002; Waddoups 2005). Waddoups (2005) finds that union premia are greater in industries which have been traditional union hotbeds (e.g., manufacturing, transport, utilities, etc.), although they have declined over time. In less unionized

industries, like the service sector, there is a smaller premium which has held relatively stable through the years (Waddoups 2005). Bratsberg and Ragan's (2002) results ostensibly indicate that union wage premia tend to be higher in sectors where foreign labor cannot compete, such as transportation and construction. However, they do add the unintuitive caveat (contradicting much of the literature) that increased import penetration is associated with increases in the premium, apparently because union wages hold up better to non-union wages in the face of global competition (Bratsberg and Ragan 2002). Differences across industries are observed among a range of the previously listed determinants as well, such as union density, firm size, economic rents, labor and output market competition, and the scope and impact of regulation. Less easily explained variation may stem from differing labor market structures from industry to industry, such as the use of contract and part-time workers (see Gomez and Lamb 2019 for a review of the premia for such workers). Sociocultural differences across industries could be another variable at play. For example, Kerrissey and Meyers (2021) report that unions in the police and fire sectors have a notable history of discriminatory attitudes. It is plausible that in some industries there are commonly held attitudes and beliefs which can affect the goals and strategies of unions, by extension affecting the union wage premium. Career choice is influenced by personality (Mullola et al. 2018; Rosenbloom et al. 2008) implying those with certain personality traits may congregate disproportionately in certain occupations. Insofar as personality influences attitudes toward unionism (see Kirmanoglu and Baslevent 2012), differences in the personality makeup by industry and occupation could therefore affect unionization, for example, union militancy, and the union wage premium across these lines.

Shifts in the relative sizes of various industries have contributed to de-unionization at the macro level, and the size of union wage premium. There has been a general shift, at least in

developed countries, toward services, where unions have historically had difficulties organizing, and away from manufacturing, a tradition union stronghold (Açikgöz and Kaymak 2014; Magda et al. 2016). As outlined above, it appears that union power and union wage premia in service industries are diminutive relative to industries with stronger union precedents. The smaller organizational sizes and greater employee turnover in many service industries (see Simms 2013) may make lower skill service industries more difficult to organize. Higher skill service industries (e.g., engineering, technology, finance, and law) may be less amenable to unionization due to the previously cited tendency of unions to reduce wages for those in the upper percentiles of the income distribution. Açikgöz and Kaymak (2014) estimate changes in industrial composition are attributable for roughly 20% of the decline in the United States' unionization rate.

In addition to union wage premium differences at the industry level based on output, there are differentials between the private and public sectors. Most union wage research, particularly in the 20th century (although the trend persists), largely neglected the public sector (Blanchflower and Bryson 2004; Kerrissey and Meyers 2021). Public sector union membership has generally increased alongside an aggregate decline in private sector union members (Hirsch and MacPherson 2003), demonstrating the increased importance of this line of research. After reviewing the literature, Benjamin et al. (2012) underscore how earlier studies find that the union premium is larger in the private sector (see also Lewis 1990 for a review of earlier public sector studies), yet more recent work indicates a similar premium in both the private and public sectors. Bryson and Blanchflower (2004) find similar private and public sector premia in the United States, while in a later study the authors find that the union premium in the United Kingdom's public sector is approximately twice as large as it is in the private sector, after controlling for other determinants (Blanchflower and Bryson 2010). In the United States and Canada, Card et al.

(2020) find that the public sector union wage gap for women has declined since the 1970s/1980s, whereas for men it peaked in the 1990s and had declined by 2015. For female workers, the greater union wage gap in the private sector relative to the public sector declined over time, as the magnitude of the private sector decline has been even greater than it is in the public sector (Card et al. 2020). In the United States, the public-private difference for women was negligibly in favor of the private sector in 2015; in Canada, the union wage gap had grown larger in the public sector than it was in the private sector (Card et al. 2020). Finally, the authors find that the union wage gap is much greater for men working in the private sector than it is for male public sector workers in each year they cover across both countries. Blanchflower and Bryson (2004) hint that the preponderance of industry-level bargaining for public sector unions may strengthen their bargaining position and lead to their improved wage premium in recent years. Bahrami et al. (2008) review theories that offer insights into whether public or private sector should lead to greater union wage premia, noting that there are convincing theoretical arguments for either sector having the higher premium. In any case, the public sector premium does not clearly run parallel to that of the private sector premium in either direction. Certain groups of workers within each sector may fare relatively better than others. Lewis (1990) gives the example of local government workers doing quite well in terms of bridging the gap in favor of the private sector which most studies of the time identified, while Blanchflower and Bryson (2010) find differences in the union premium along the skill distribution for public sector workers compared to those in the private sector.

The wages of union workers are very much dependent on economic factors that span the micro and macro levels of analysis. The economics of the organized firm and the economy at large are both important. Ultimately, union workers rely on the survival of their employer to

receive their wage. Freeman and Kleiner (1999) therefore point out that rational unions would not raise wages high enough to jeopardize the existence of their employer. Findings are mixed but tend to show minimal evidence, at best, to support a link between unionization and business closure, conditional on other factors such as firm size, country, and time of the analysis (Campello et al. 2018; Fang and Heywood 2006; Freeman and Kleiner 1999). Economic considerations likely impose natural lower and upper bounds on the union wage premium. Below a certain wage, worker support for union organizing and willingness to pay union dues would be expected to erode; likewise, above a certain wage, management opposition would intensify and the ability of firms to profitably bear the extra costs would be precluded (Kulkarni and Hirsch 2021). In fact, the extent of a firm's profitability affects the wages unions can bargain for. Unions can bargain for higher wages given greater economic rents extracted by the firms they bargain with (Bilginsoy 2013; Breda 2015). In this sense, economic rent refers to the payments a firm receives above what it requires to maintain its current operation (Hashimzade et al. 2017). Greater rents equal greater leeway to make wage concessions while staying financially solvent. Using data from France, Breda (2015) estimates that as a firm moves from low to high rents, the union wage premium rises from an average of approximately 0% to 8%. The economic rents of firms, in turn, are influenced by input and output market competition. Bilginsoy (2013) gives a useful overview of these relationships. On the input side, unions have less bargaining power when employers can more easily substitute away from union workers; in economic jargon, this means that bargaining power has an inverse relationship with the elasticity of labor demand. This elasticity increases if there are more possibilities to employ non-union workers instead, whether domestically or in another region or country. Elasticity of labor demand also increases when there are more opportunities to substitute capital for union labor. There is a stark wage-

employment trade-off in occupations at high risk of automation, as unions hinder the earnings decline which occurs in such occupations at the cost of hastening the decline in employment (Parolin 2021).

On the output market side, increased competition reduces the economic rent accruing to firms, and therefore weakens union bargaining positions (Bilginsoy 2013). As a result, liberalized international trade regimes can decrease union wage premia by simultaneously raising labor and product market competition (Abraham et al. 2009; Bilginsoy 2013; Kreickemeier and Meland 2013). When the price elasticity of demand of a firm's output is low (i.e., demand changes minimally in response to price changes), for example in the case of a monopoly or oligopoly, unions are expected to be more successful in raising wages (Blanchflower and Bryson 2010). With a low price elasticity of demand, employers make a surfeit of profits to share with a union and/or have greater ability to pass cost increases on to customers (Blanchflower and Bryson 2010). Union wages are also countercyclical; contrary to what one would expect when solely considering economic rents, union wage premia rise during recessions (Blanchflower and Bryson 2004; Bratsberg and Ragan 2002). There are a few main reasons for this outcome. First, union workers tend to have longer-term wage contracts, which help isolate union wages from macroeconomic vicissitudes (Gunderson and Hyatt 2001). Second, the additional leverage provided by collective bargaining and the threat of a strike may reduce the likelihood of a recession induced wage decrease. Third, union activity increases during recessions (Freeman and Medoff 1984). The workings of the three above factors put unionized workers in a more favorable position than their nonunionized counterparts during a recession, therefore widening the union wage premium in such times.

3.3: Macro-level Factors

As section 2 made clear, government legislation and regulation have profound effects on union wage premia. Without a conducive legislative environment for unions, management has the structural power and an expanded set of tools with which it can impede union effectiveness. Section 4 provides greater country-specific details on union legislation, but it is worth reviewing general theories on the union-government relationship here. The actions of government can affect union wages in two ways. The first of these channels is indirect, as governments can make reforms that change other determinants of union wages. For example, interstate and intrastate deregulation of the United States trucking industry enhanced competition, thereby decreasing the economic rents of trucking firms and hence the wage premium of unionized truckers (Trick and Peoples 2012). Deregulation can have varied effects on the union wage premium by industry, ranging from positive to insignificant to negative effects, mainly depending on whether deregulation spurs competition (Bratsberg and Ragan 2002). The second channel is labor legislation and regulation which affects unions directly. A salient example of such legislation is the Taft-Hartley Act. Enacted by the United States Congress in 1947, the law, in the words of Callaway and Collins, “curbed a variety of union tactics, allowed employers to campaign against union formation, outlawed ‘closed shops’ (in which only union members could be hired), and permitted states to pass ‘right-to-work’ [RTW] laws” (2018, p. 97).

The lattermost of these changes, RTW laws, allow workers in a union bargaining unit (the group of workers who are represented by a union or collective bargaining agreement) to individually opt out of being union members and paying union dues (Zullo 2021). In jurisdictions without RTW laws, collective bargaining agreements can stipulate that those in the bargaining unit must pay fees to aid the financing of core union activities. RTW laws therefore give rise to the free rider problem (Ichniowski and Zax 1991), where workers in the bargaining

unit can avoid paying union fees while still enjoying the benefits of unionism and collective bargaining. Classical economics logic would suggest that a 'rational' actor in this scenario would opt out of the fees; the problem here being that, once a critical mass of union leavers comes to pass, union power can wither to the point where the institution's effectiveness is lost. Some free riders may simply not wish to be union members for one reason or another, potentially due to holding some sincere religious or ideological views, or believing that the cost of union dues outweigh the benefits that their union provides; others are true free riders in the sense that they believe the benefits outweigh the costs, yet they opt out of paying dues for the sake of short-term pecuniary gain (Sobel 1995). Given the free rider problem and the, *ceteris parabis*, adverse effect on union coffers presented by RTW laws, one would suspect at first glance that these laws would hinder union bargaining strength, and thereby union wage premia. However, empirical work on the RTW law and union wage relationship is varied, with the legislation appearing to have minimal impacts on wages (Devinatz 2011; Moore 1998). Reed (2003) proclaims that RTW laws positively affect wages, while Chava et al. (2020) state that the laws have negative impacts on union wages. Bruno et al.'s (2015) review concludes that RTW laws have an average effect of 0 to -5% on wages.

Globalization and international competition have accelerated since the 1980s until recent years (Judzik and Sala 2013) and are commonly cited as reasons for declining union wage premia (Beladi et al. 2013). However, Beladi et al. (2013) caution that the globalization process has led to increased capital inflows to complement with low-cost labor in developing countries which have strengthened unions in such countries. While he acknowledges that the usual narrative is one of strengthened unions in developing countries as international trade increases, Anner (2011) finds that union power decreases in Central American manufacturing plants which

are recipients of outsourced jobs from other countries. The globalization-unionization link is likely negative in those developed countries with already high levels of capital who have been exposed to increasing levels of product and labor market competition, especially from low wage countries (Abraham et al. 2009) as the result of globalization.

Garnero (2021) provides a taxonomy of union bargaining systems to elucidate how they can differ across national borders. The three dimensions of this taxonomy are the level of bargaining, the degree of flexibility, and wage coordination. First, bargaining can occur at the firm level, the sector level, or across sectors (Garnero 2021). Some countries, such as Germany, have a multi-level bargaining structure (see Ellguth et al. 2014). Research into wage differentials by bargaining system is scarce, with drastically differing results. Dahl et al. (2013) suggest that there is a premium associated with firm-level bargaining, whereas Müller and Upmann (2018), using a theoretical model, hypothesize that decentralized (e.g., sector-level) bargaining leads to relatively higher wages as the union and employers' federation are expected to effectively collude to increase output prices. As per Müller and Upmann (2018), decentralized negotiations will lead to an increase in output price secured through reducing output, realized by the employers' federation conceding a higher wage to the union. Dahl et al. (2013) review four theories which explain their finding of higher wages from firm-level agreements: rent-sharing, using higher wages to induce greater efficiency, prioritizing wages over employment as the benefits of insiders would be relatively favoured at the firm-level, and externalities being less of a concern at this level. On a highly decentralized level, Granqvist and Regner (2008) find that bargaining agreement provisions which allow for some individual-level bargaining result in higher wages, although this may be caused by such provisions enticing higher skilled workers into unions. Capping off the variegated results of the bargaining level and wage premium

literature, Magda et al.'s (2016) results fail to show a wage premium for firm or industry-level agreements in the Czech Republic, while firm-level agreements consistently led to premia in Hungary, and industry-level premia emerged in both Poland and Hungary in 2006. Bargaining level also has distributional implications, with higher skill workers tending to benefit more from firm-level agreements, while lower skilled workers fare better under industry-level agreements (Dahl et al. 2013; Magda et al. 2012). In multi-tier systems, industry-level agreements are said to set a wage floor, and firms can surpass the floor based on additional firm-level bargaining (Addison et al. 2022; Magda et al. 2012). The four theories explicated above by Dahl et al. (2013) help explain this distributional implication, as when negotiations are decentralized, skilled workers likely have greater leverage in securing rents for themselves vis-à-vis their less skilled co-workers. On the flipside, higher order concerns may take greater emphasis at the broader industry-level of bargaining.

There is less research into the second and third dimensions of Garnero's (2021) taxonomy: flexibility and wage coordination. Opt-out clauses (sometimes referred to as opening clauses), which allow firms conditional flexibility to adjust wages downwards, generally correlate positively with wages (Ellguth et al. 2014; Garloff and Guertzgen 2012). This is driven in part by a selection effect since firms that pay higher wages are more likely to adopt flexible measures (Garloff and Guertzgen 2012), but there is also a 'price for flexibility', as unions see an increase in baseline wages in exchange for the downside risk of the clause (Braendle 2017). When opt-out clauses are applied, the effect on wages is unambiguously negative (Braendle 2017), with Ellguth et al. (2014) estimating that the wage cuts from the clauses typically reduce wages by roughly the same magnitude as the compensating differential arising from the clauses.

Wage coordination, the third bargaining system dimension, correlates with more centralized (i.e., industry-level or higher) bargaining but can occur in the instance of decentralized (i.e., firm-level) bargaining as well. Decentralized yet coordinated bargaining is titled pattern bargaining, wherein independent unions seek to achieve similar goals in separate negotiations (Roche and Gormley 2020). Pattern bargaining allows unions to push wages upward (Roche and Gormley 2020) by decreasing inter-union labor competition (Creane and Davidson 2011).

In sum, the impact of legislative changes on the union wage premium over time is ambiguous and highly dependent on the country under study. There is also considerable variation from study to study when it comes to analyzing the effects of legislation such as RTW laws.

Social and cultural factors tie in heavily to governmental factors. One classic study finds that United States union growth correlates significantly with the share of Democrats in the House of Representatives, which can be taken as a proxy for pro-union sentiments since the Democrats are more pro-union than the Republicans (Ashenfelter and Pencavel 1969). Pro-union sentiments are expected to therefore increase union power and legitimacy, which should filter through and have positive effects on union wages. Political and social attitudes, and beliefs about unions specifically, are significant determinants of union membership (Schnabel 2003). Kirmanoglu and Baslevent (2012) find that the personality traits of self-transcendence and conservation positively correlate with union membership, whereas openness-to-change and self-enhancement correlate negatively. Research from Japan intimates that there has been a decreased desire to organize unions in the country's workplaces, which is allegedly the main factor in the decline of unionization in the country (Tsuru 2010). It is not fully clear whether this is due to more negative sentiments toward unions, or simply less faith in the benefits provided by unions. However, there

is reason to believe that a rise in support for merit-based systems and performance-based pay may explain the decreased desire to organize unions (Tsuru 2010). Still, Schnabel (2013), citing a dearth of evidence, states that whether changes in values and attitudes have affected unionization is an open question. Evidence on whether values and attitudes impact the union wage premium directly, controlling for other factors, appears especially scarce. The most that can be said with confidence is that they have an indirect impact by influencing union membership decisions, thereby affecting union density, a determinant of the union premium.

Another line of inquiry studies management opposition to unions. Management opposition makes union organizing more difficult, indirectly reducing the upward wage pressure of unions by decreasing their proliferation (Naylor and Raaum 1993). A higher premium can also galvanize more negative attitudes toward unions on behalf of employers (Hirsch and Schumacher 2001), and this negative change likely outweighs any change toward the positive from the employee perspective (Freeman 1986). Taking these two considerations together, the relationship between management attitudes and union wages may be endogenously determined. Campolieti et al. (2012), reviewing the literature on management opposition in both the United States and Canada, conclude that most studies affirm that managers in the United States are more hostile towards unions than their Canadian counterparts. However, the survey conducted by the authors indicates that the opposite is in fact the case. This is explained in part by unions having greater power, and therefore posing a greater threat, in Canada compared to the United States, potentially driving more negative attitudes (Campolieti et al. 2012). Overall, there is little to no evidence of management attitudes' impact on union wage premium outside of the oblique effect they have on union density. There is strong evidence to suggest that such opposition has increased over time, at least since the height of unionism in the 20th century, but it is not

necessarily a substantial reason for the decline in unionization (Hirsch and Schumacher 2001). Thus, it is likely that more fervent management opposition has played a role in the declining union wage premium through the channel of decreasing union density. Outside of the tangential density impact, it is unclear whether there is a direct impact of management opposition on the union wage premium, likely because of a lack of data linking managerial attitudes, a subjective and hard to obtain measure, with wages and the myriad of other control variables necessary to conduct a rigorous union wage premium study.

4: Union Wage Research Methodologies and Empirical Evidence

This section first reviews empirical methods, then empirical evidence, from union wage premium studies. The country-level/regional review is broken down into developed and developing countries, since there is less data from the latter, and since exogenous trends, such as globalization (Beladi et al. 2013), may impact countries differently depending on their stage of development.

4.1: Econometric Issues and Traditional Union Wage Research Methodologies

At the most basic level is the difference between unadjusted and adjusted wage gaps. The unadjusted gap is the raw difference in wages between union and non-union workers without controlling for other individual, job, and firm characteristics, and other macroeconomic factors that influence wages (Bilginsoy 2013). From 1983 to 2002 in the United States, Blanchflower and Bryson (2004) find that the unadjusted union wage gap is roughly twice that of the adjusted gap, demonstrating the importance of including a substantial enough number of controls and wage determinants other than union status.

Although it was not always widely available (Callaway and Collins 2018), most studies use micro-level data, especially on an individual-level, to capture a range of control variables. Controls differ based on the study, and some variables are not available in certain datasets. There is also debate on whether to include some types of controls, such as those for occupation and industry (Kerrissey and Meyers 2021). An inexhaustive sample of control variables in union wage premium studies includes geographic variables (sometimes at multiple levels, for example, province/state as well as urban/rural location), public/private sector, industry, type of firm (e.g., multinational or local firm), firm size, occupation, job tenure, hours worked, whether the job is permanent, years of experience, demographic factors such as age and sex/gender, education level, whether the worker is currently in school, marital status, whether the worker has a minor-aged child, immigration status, the language used at home, and ethnicity (Campolieti 2018; Fang and Verma 2002; Gomez and Lamb 2019; Gunderson et al. 2016; Kerrissey and Meyers 2021). Estimates tend not to vary much based on differences in control variables, and most lists of controls are fairly standard (Hirsch 2004). Likewise, the estimates do not tend to vary much, if at all, whether union membership or union coverage (since in some jurisdictions collective agreements can cover non-members) is used as the union status variable (Budd and Na 2000; Goerke and Pannenberg 2011).

Difficulty arises when the numerous endogeneity problems inherent in union wage studies (Addison et al. 2022), and labor market studies more broadly (Açıkgöz and Kaymak 2014) are considered. The two primary concerns of this nature are the possibility of more (or less) skilled, productive, and/or motivated workers self-selecting into unions at the individual level; and unions choosing to organize in firms that would bring greater benefits, such as those with more surplus profits, at the firm level (Addison et al. 2022; Blanchflower and Bryson 2010).

Employers also have a degree of choice over who works for them. Since unions are typically more beneficial for lower skill workers, highly skilled workers are more likely to avoid being union members; within the ranks of those with lower skills, those with particularly low bargaining power are most likely to try to join a union, but employers prefer to select more relatively skilled candidates out of this pool (see Abowd and Farber 1983; Card 1996; Hirsch and Schumacher 1998). The result is that amongst the group of lower skilled workers, the most competent (with characteristics that positively correlate with wages) are more likely to be union members, while amongst the highly skilled group those who are relatively less competent are more likely to be union members. What makes this issue even more difficult to deal with is that characteristics which are unobservable to researchers (e.g., personality and motivation) can drive some of the selection into unions as well as pay outcomes (Gunderson et al. 2016; Lewis 1986). Unobservable characteristics of firms that correlate with higher wages (Breda 2015) or employer selection into union coverage (Blanchflower and Bryson 2010) could partially explain the union wage premium, too.

These endogeneity problems, among other econometric issues to be discussed, suggest that the selection of a union wage research methodology is crucial. Basic ordinary least squares (OLS) methods have often been used in the literature (Campolieti 2018). H. Gregg Lewis (1963, 1986), a notable economist in the field (Hamermesh 2020), argued that OLS was the least biased estimator in union wage studies (Blanchflower and Bryson 2010). The OLS approach often takes the form $W = \alpha + \beta X + \gamma U + \mu$, where the dependent variable W is the natural log of hourly wage, U is the union status variable, α is a constant, μ is the error term, and β and γ are coefficient. In this specification, the coefficient γ is taken as the union wage gap in percentage

terms. Another way of specification is to estimate separate equations for both union and nonunion workers:

$$\text{Equation 1} \quad W_u = \alpha_u + \beta_u X_u + \mu_u$$

$$\text{Equation 2} \quad W_n = \alpha_n + \beta_n X_n + \mu_n$$

All the variables and coefficients are the same as above, except for the fact that they are separated into the categories u for union and n for nonunion in Equation 1 and 2, respectively. The union wage premium can easily be calculated by comparing the estimated union wage (W_u) with the estimated nonunion wage (W_n). OLS union wage studies cannot tackle the selection bias induced endogeneity problem, and also suffer from the model's linearity assumption as well as difficulties accounting for union members not being a random sample (Campolieti 2018).

One class of important models are often called bias-correction, or selection-correction, methods first developed by James Heckman (1976), and involve procedures aiming to mitigate the impact of endogeneity. Perhaps the most popular of these methods is the Inverse Mills-Ratio Model (IM Model), sometimes called variations of the Heckman model and Lee model. Lee (1978) first used a similar method to that applied by James Heckman (1976) in a study on labor market characteristics by gender, extending it to the study of the union wage premium. The IM model was then used in subsequent union wage studies by Duncan and Leigh (1980) and others. This model starts with a union status equation which is then estimated in a reduced form (with the union wage gap excluded) with a probit regression (Hirsch 2004). While different authors use slightly differing specifications, a general form (based on Duncan and Leigh 1980 and Hirsch 2004) is as follows:

$$\text{Equation 3} \quad U = \alpha + \beta X + \gamma(W_u - W_n) + \mu$$

The variables are denoted the same as in the OLS equation above. Union status is estimated as a function of a vector of control variables and the union wage gap. The equations for union and nonunion wages, W_u and W_n are effectively the same as Equations 1 and 2 above. Equations for the union and non-union wage equation selectivity variables, λ_u and λ_n (or IM ratios; Bilginsoy 2013), are constructed from the probit regression of reduced form Equation 1 (Hirsch 2004). An augmented form of the union and non-union wage equations (Equations 1 and 2) including the selectivity variables can then be estimated (Bilginsoy 2013; Duncan and Leigh 1980). Duncan and Leigh (1980) estimate the separate wage equations using a generalized least squares (GLS) regression. Finally, these selection and heteroskedasticity corrected ‘unbiased’ (Hirsch 2004) union and non-union wage estimates are substituted into Equation 3 (Duncan and Leigh 1980), and another regression is conducted to yield “‘structural’ estimates of the union status equation” (Hirsch 2004, p. 237). In Duncan and Leigh’s (1980) formulation, a weighted nonlinear least squares probit method is used for this final regression. More detailed expositions of this model can be found in Lee (1978) and Duncan and Leigh (1980).

Another key selection-correction method was proposed by Duncan and Leigh (1985), which will henceforth be called the instrumental variables (IV) method. In this method, the probability (P) of being a union member is predicted from the union status equation (Equation 3) using a logit regression; a general wage equation is then estimated by weighting the right-hand sides of the union and non-union wage equations by union status (Bilginsoy 2013; Duncan and Leigh 1985):

$$\text{Equation 4} \quad W = U \cdot \beta_u X_u + (1 - U) \cdot \beta_n X_n + [\mu_u + (1 - U) \cdot \mu_n]$$

The predicted probability of being a union member from the first step, P , is then instrumented for union status, U , and Equation 4 is estimated (Bilginsoy 2013; Budd and Na 2000). Ashraf (1992) extends this procedure to estimate IV models for an array of worker groups, comparing them to OLS and IM models as well and finding highly heterogenous results both within and between models. A final correction method of note is two-stage least squares regression using IVs (see Budd and Na 2000; and Landerretche et al. 2013).

Bilginsoy (2013), reviewing the thoughts of Lewis (1986), Freeman and Medoff (1982), and Booth (1995), cites a variety of problems with the endogeneity correcting methods that have caused some researchers to prefer OLS or other techniques: arbitrary exclusion restrictions, misspecification and omitted variable bias in the union status equation, and unrobust and unrealistic estimates. The lack of a stable pattern of results is a main objection of both Lewis (1986) and Freeman and Medoff (1982) to studies which work to deal with endogeneity (Robinson 1989; Hirsch 2004). Selection-correction methods have two primary issues (Hirsch 2004). First, there are few good candidates for an instrumental variable which is a determinant of union status yet uncorrelated with wages (Gunderson et al. 2016; Hirsch 2004). Second, the models assume a homogenous union density at the top and bottom of the skill distribution, violating evidence on differential union membership selection by skill level (Card 1996). The Heckman model also assumes a joint normal distribution of the error terms in Equations 1, 2 (the wage equations), and 3 (the union status equation), although the IV method (Duncan and Leigh 1985) does not require this strong assumption (Bilginsoy 2013; Budd and Na 2000). It does, however, assume joint densities of the union and nonunion wage equation error terms (Bilginsoy 2013).

Nevertheless, other researchers, notably Robinson (1989), defend selection-correction models (Bilginsoy 2013; Hirsch 2004). Robinson (1989) asserts that OLS estimates are biased downward since they do not account for selection effects, and that the volatility of selection-correction results is substantially reduced when examining only studies using large, individual-level datasets.

While the preceding discussion has focused on cross-sectional analyses – studies using one time period of data – many longitudinal analyses of the union wage premium have been conducted as well. Longitudinal studies analyze workers, or perhaps firms, over time, typically focusing on changes in union status and commonly using a fixed effects specification, or some variation on it (Freeman 1984). A longitudinal approach has the key benefit of being able to control for unobserved ability or motivation, which can differ from one worker to another (Kulkarni and Hirsch 2021), by keying in on the wage changes of given workers over time as they change union status. The primary drawback of longitudinal methods is that, because of the small number of changes in union status, even small measurement errors in the coding of union status can exert a substantially negative downward bias in the wage premium (Freeman 1984). A recent study by Walsh (2013) confirmed this drawback, finding that the longitudinal union wage premium estimate rose from 5.8% in the full sample to 10.9% for a subsample including only workers whose union status was verified by a researcher (similar to the 12.5% cross-sectional estimate for that sub-sample). Walsh (2013) finds that the difference between cross-sectional and fixed effects estimates for the measurement error mitigating subsample tends to be 3% or less, largely in line with other results from Hirsch (2004) and Card (1996) that find little effect from unobserved ability bias. Longitudinal estimates can also be biased due to endogeneity between

union status changes and job changes, with status changes potentially being determined partly by wage offers (Kulkarni and Hirsch 2021).

With some exceptions (i.e., Ashraf 1992, who finds that OLS estimates of the union wage premium fall in between IV estimates on the high end and IM estimates on the low end), most research supports the notion that endogeneity correction methods set a high bound for union wage premium estimates, with longitudinal estimates being the low bound and OLS estimates occupying somewhere in the middle (Robinson 1989). This notion is supported by Freeman (1984) viewing OLS estimates as an upper bound and fixed effects estimates as a lower bound, as well as Budd and Na (2000) positing that OLS presents a lower bound relative to selection/endogeneity correction techniques. Robinson (1989) finds cross-sectional OLS results which converge near a 20% union wage premium across models, while cross-sectional selection-correction methods yield results between 27% and 43%. Both OLS and selection-correction methods are lowered using longitudinal data, to ranges of approximately 11-16% and 16-24%, respectively (Robinson 1989). The general range for longitudinal studies appears to be a union wage premium between roughly 5% and 15% (Card 1996; Freeman 1984; Hirsch and Schumacher 1998; Graham et al. 2018; Kulkarni and Hirsch 2021; Walsh 2013) and estimates usually exceed 20% for selection-correction studies (Robinson 1989). Most studies, at least in the United States, find a premium somewhere between 10-25% (Blanchflower and Bryson 2004; Budd and Na 2000; Lewis 1963, 1986), although some earlier studies went as high as exceeding a 30% premium (Freeman and Medoff 1984). Benjamin et al. (2017) peg a 15% average for OLS studies and a 10% average for longitudinal fixed effects studies that use data from the United States, compared to an earlier United States based study average of 25% as per Freeman and Medoff (1984). However, estimates can vary widely even between studies using a generally

similar methodological approach, evidenced by the variation in results from selection-correction studies. As a salient example, two studies using the same longitudinal dataset, the National Longitudinal Survey of Youth 1979, find average premiums of 9% (Graham et al. 2018) and 22% (Gabriel and Schmitz 2014), respectively.

4.2: Other Methodologies

Although selection-correction, longitudinal (especially fixed effects examining union status changers), and particularly OLS models are most common in the union wage literature, other methods have been developed over time. Blackburn (2007) suggests that the union wage premium is somewhat overestimated by the common log-linear wage specification as it fails to account for different variances in union and nonunion wages. To handle this ‘retransformation’ problem, he advocates for the use of quasi-maximum-likelihood (QML) methods which require less distributional assumptions about the wage (Blackburn 2008). Another way around the problem is propensity score matching (PSM; Campolieti 2018; Eren 2007; see also Bryson 2002). PSM can also deal with interaction terms or higher order variables which OLS and other models cannot incorporate as easily, while doing a better job of handling ranges of values for which conditioning variables do not ‘overlap’ for union and nonunion workers (Eren 2007). In essence, this methodology attempts to mimic a natural experiment by ‘matching’ a group of unionized employees to a group of nonunion employees with as similar as possible observed characteristics (Eren 2007), thereby forming counterfactuals for union workers (Campolieti 2018). The probability of being in the unionized ‘treatment group’ based on a given set of observed covariates is the propensity score, which is the basis for the matching procedure (Eren 2007). Results from PSM studies vary considerably. At one extreme, Eren (2007) finds that the PSM technique increases the wage premium vis-à-vis OLS by roughly 30% (a 27-28% premium

versus 21% for OLS). At the other, Bryson (2002) finds a statistically insignificant 3.5% premium. Finally, Campolieti's (2018) results are more ambiguous, showing no clear pattern when comparing OLS and matching estimates and relatively similar results on average (in the low-mid single digits). However, it should be noted that these studies draw on data from different countries – the United States (Eren 2007), the United Kingdom (Bryson 2002), and Canada (Campolieti 2018), respectively.

Another natural experiment method of sorts is the analysis of close union certification elections using a regression discontinuity design (RDD; DiNardo and Lee 2004; Frandsen 2012, 2021; Lee and Mas 2012). This methodology compares wages paid by employers where unions narrowly won certification with those paid by employers where unions narrowly lost their organizing election and finds negligible wage effects on average (DiNardo and Lee 2004; Frandsen 2012), although the wage effect of unions is positive in the left tail of the earnings distribution and negative in the right tail, further evidence of union wage compression (Frandsen 2012, 2021). While this quasi-natural experiment design is advantageous due to its counterfactual approach and exposition of the short-run effects of unionization at the micro-level, it has its limitations. Union elections won by a large margin may result in a more substantial wage premium (Lee and Mas 2012), possibly due to weaker bargaining power for unions that barely win certification (Zhang 2019), but cannot be examined using RDD by its definition. The RDD approach also only studies the short-run after a union election (Rios-Avila and Hirsch 2014) and is not applicable to many countries on account of heterogeneity in labor market institutions across jurisdictions (Breda 2015). Taken together, these considerations weaken the generalizability of the methodology.

Recognizing that unions have differential effects on wages for workers at various points in the earnings or skill distribution, some researchers have used quantile regression models that estimate different union wage premia at various percentiles across the earnings distribution (Callaway and Collins 2018; Chernozhukov et al. 2013; Graham et al. 2018; Gunderson et al. 2016). This literature tends to confirm that the premium is larger for those who earn less, and negligible or negative for those near the top of the earnings distribution. However, Chernozhukov et al. (2013) find that the quantile effects are much flatter after controlling for unobserved skills, indicating that individual heterogeneity is a key source of selection effects. Wage impacts by quantile are dependent on the region under analysis, as well. Using Chinese data, Gunderson et al. (2016) demonstrate that the union earnings premium is highest at the left tail of the pay distribution, almost as high at the right tail, and lowest in the middle. The authors attribute this in part to the representation of management in Chinese labor unions, as highly paid managers may leverage their union influence to bargain for relatively higher wages for themselves (Gunderson et al. 2016). For a more extensive review of the statistical foundations and literature on quantile regressions, see Chernozhukov et al. (2013) and Graham et al. (2018).

Usually based on the Oaxaca-Blinder decomposition (Oaxaca 1973), and subsequent work building on it or influenced by it, notably Firpo et al. (2018), some union wage research has ventured to decompose the union wage premium into different explanatory components (Addison et al. 2022; Bahrami et al. 2008; Bilginsoy 2013; Gunderson et al. 2016; Rios-Avila and Hirsch 2014). On a basic level, the Oaxaca-Blinder decomposition (Oaxaca 1973) can show the extent that union and non-union wages differences can be explained by differences in the explanatory variables in the wage equation across the two groups ('endowment effects'), and the extent that the union wage premium is unexplained by such differences, rather the differences in

coefficients between union and non-union equations ('coefficient effects'). The wage gap can be further decomposed along the detailed independent variable and control variables, and by specific quantile of the wage distributions. This literature is difficult to summarize as the applications of the decomposition, as well as the exact decomposition technique used, differ substantially. To review a few applications, Bahrami et al. (2008) use decomposition to study premia differences in the public and private sectors, Bilginsoy (2013) uses decomposition to assess what factors contributed to the declining union wage premium in the United States construction sector (finding declining union power to be the main factor), and Gunderson et al. (2016) decompose the total union compensation gap into two components: one for differences in explanatory characteristics between union and nonunion workers, and another for differences in returns to these characteristics.

To conclude, it should be mentioned that some of these techniques can be combined. For example, Graham et al. (2018) combine quantile regression with a longitudinal 'union status changer' methodology. Other methodologies that were not previously mentioned may be feasible as well, such as Açıkgöz and Kaymak's (2014) estimation of a union wage premium parameter out of a macroeconomic model.

4.3: Recent Empirical Evidence in Developed Countries

As the preceding subsections made evident, methodological choices can greatly change empirical estimates of the union wage premium. This means that studies that use the same methodology to measure the premium at different points in time are more reliable indicators of the time trend than cross-study comparisons. Premia also vary depending on an array of other factors previously mentioned, including skill level, occupation, and gender. This section will review empirical estimates of the average union wage premium by country, as the premium can

differ drastically due to legislative differences and other sources of labor market heterogeneity across borders. Since there have been numerous union wage premium literature reviews in the past, emphasis is placed on recent studies and those that trace out the premium over time. Studies that present mean estimates without differentiating based on observable characteristics are a focal point as well; a lot of recent research in this area only estimates premia for subsections of the labor force rather than for the average worker (e.g., differences in the premium by gender, skill level, or public/private sector position) and can therefore not be readily compared to most other papers. To provide insights as to why the average premium may differ from country to country, brief descriptions of the labor market of each country are given prior to the estimates. The OECD/AIAS (The Amsterdam Institute for Advanced Labour Studies) *Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts* (ICTWSS) is referred to, when possible, as a uniform country-level union system typology. Freeman and Medoff's (1984) distinction between the monopoly and voice faces of unions helps to conceptualize how legislative and labor market heterogeneity can so greatly sway union wage premium estimates.

4.3.1: United States

Considerable variation in labor law exists from state to state within the United States, but the foundational national legislation remains the 1935 Wagner Act (Callaway and Collins 2018). However, the 1947 Taft-Hartley Act serves to weaken the union power granted by the Wagner Act, allowing states to pass RTW laws and employers to campaign against union formation, and forbidding closed shops, among other provisions (Callaway and Collins 2018). As such, labor unions in the United States wield notably less power than those in even comparable countries like Canada (Campolieti et al. 2012; Zhang 2019), although their wage effect tends to be greater

than in other developed countries (Rios-Avila and Hirsch 2014). There has been a consistent downward trend in collective bargaining in the country in recent decades, and bargaining overwhelmingly occurs at the firm-level (OECD/AIAS 2022). Collective agreements can include ‘opening clauses’ that allow for adjustment or renegotiation under certain circumstances (OECD/AIAS 2022).

Lewis (1963) indicates that the country’s union wage gap was just 5% in the 1940’s and increased to 10-15% as the 1950’s wore on. Freeman and Medoff (1984) found an average union wage premium of 25% in 1970’s United States studies, compared to a 15% average premium in more recent studies, according to Benjamin et al. (2017). Early 21st century studies that compute yearly premium estimates confirm the downward trend, which started in the 1980s after an increase in the premium in the 1970s (Blanchflower and Bryson 2004). Blanchflower and Bryson (2004) estimate that the premium in the United States peaked at 20.4% in 1984, declined all the way to 13.4% in 2000, then rebounded a few percentage points in the wake of the 2000 recession. A similar trend is observed when examining just the private sector, although Blanchflower and Bryson (2004) find that the private sector premium has usually been slightly greater than that in the public sector since the mid 1980’s (between 0-2% higher each year, with few exceptions). In their preferred specification, Hirsch and Schumacher (2004) estimate a peak premium of 23.3%, also in 1984, declining to 18.2% in 2001, a comparable figure to their mid-1970s estimates. Blackburn (2008) yields a smaller decline of roughly 2-3% from 1983 to the early-mid 2000s due to methodological differences – estimates for the later period are in the mid-high teens in terms of percentages. More recently, Card et al. (2020) demonstrate a continued decline in the premium, finding it to be approximately 22% for both male and female workers in the United States in 1984, declining to about 16% and 9% for the respective groups by 2015.

However, while the 2015 premium is significantly lower than in 1993, the authors do not display results for the early 2000's. Blanchflower et al. (2021) have extended the analysis from Blanchflower and Bryson (2004) from 2000 up to 2019. These estimates fluctuate between 12-15%. Although the authors conclude that there is no "discernible pattern" (Blanchflower et al. 2021, p. 10), 2019's mark of 12.1% is the lowest premium of any year in the study. In contrast to these studies, Gabriel and Schmitz (2014), using longitudinal data, yield a relatively stable premium near 22% from 1990 to 2010.

Recent work in the United States that examines a single year's premium accords with most of the studies that apply the same methodology to numerous years, and tends to hover between a 10-20% premium, essentially in line with observations from Blanchflower and Bryson (2004) and Benjamin et al. (2017). From low to high figures, studies have found United States premia of 9% (Graham et al. 2018), 15% (Kulkarni and Hirsch 2021), 0.184 log points (Rios-Avila and Hirsch 2014; log points are commonly interpreted as equivalent to the premium in percentage terms, but this is not necessarily correct, as per Blackburn 2008), and 20% (Açikgöz and Kaymak 2014).

4.3.2: Canada

Canada's labor union system based on the OECD/AISA (2022) database looks identical to that of the United States, although it is in effect more union friendly (Zhang 2019) due in part to more favorable union election laws in some provinces and the allowance of mandatory union membership and dues payments ('the Rand Formula'; Clemens et al. 2005). Fang and Verma (2002) find a comparable downward trend in the union wage premium in Canada, declining from 20% at its peak in 1990 to 8% in 1999. Card et al. (2004) estimate about a 10% decline from 1984 to 2001. The union wage premium in the country is somewhat similar to that in the United

States (Benjamin et al. 2017), albeit lower in a number of studies, often falling in the range of roughly 5-10% (Fang and Verma 2002; Kuhn and Sweetman 1998; Renaud 1998; Zhang 2019). Campolieti's (2018) propensity score matching estimates are even lower, between 1-3% from 1997 to 2014, with no clear trend, although the more traditional methods he uses as well yield an approximately 5-8% premium in that time frame. Results from Gomez and Lamb (2019) over the same span are slightly larger, and decline from 12.4% in 1997–98 to 7% in 2013–14. Prior research from the same authors concurs with the declining premium, with it dropping from 10.1% in 2000 to 6.9% in 2012 (Gomez and Lamb 2016). Moreover, Zhang and Gunderson's (2020) OLS regressions indicate that the premium fell from 9.2% in 1998 to 5% in 2018. The longest time frame studied in a Canadian union wage premium paper comes from Card et al. (2020), who provide separate premium estimates for men and women in three years: 1984, 1993, and 2015. For men, the premium declines from 22.4% in 1984 to 18.4% in 1993 to 12.5% in 2015; for women, it declines from 42.6% to 38.8% to 33.1% over the period (Card et al. 2020). Earlier work from the same authors found a 15.3% premium for men in 2001 compared to a 22.6% premium for women (Card et al. 2004). For the sake of comparison, the same study computed an approximately 15% premium for those of both sexes in the United States for 2001 (Card et al. 2004).

4.3.3: United Kingdom and Ireland

The United Kingdom's labor market institutions are similar to those in the above North American countries but are distinct in several ways. Like the United States and Canada, bargaining mainly occurs at the firm-level (OECD/AISA 2022). By contrast, however, more multi-level bargaining at the sectoral level and more wage co-ordination in general occur, and voluntary works councils can operate alongside unions (OECD/AISA 2022). The functions of

works councils are difficult to distinguish from unions, but they only serve a limited information sharing and consultation purpose in the United Kingdom and Ireland (Degrauwe et al. 2018).

Blanchflower (1986), writing shortly after Freeman and Medoff's (1984) opus, noted that there was surprisingly little empirical evidence on the effects of unions in the United Kingdom despite their importance in the country. Many of the early results in the country fluctuated wildly due to data issues and other flaws (Blanchflower 1984; 1986). Blanchflower (1986) finds heterogeneous premia by occupation and industry, but an overall single digit premium in 1980. Stewart (1987), in a more sophisticated study than most from the era (according to Blanchflower 1986), finds premia between 7.5% and 12% depending on worker and workplace characteristics. Near the end of the 20th century, Blanchflower (1997) estimated that the premium in the United Kingdom was about 10%, compared to a familiar 15% figure in the United States. By 2004, there were questions as to whether there was even a notable union wage premium whatsoever in the United Kingdom after a clear downward trend since at least the mid-1990's (Blanchflower and Bryson 2004b). Koevoets (2007) finds only a 6% collective bargaining coverage premium for women, while no premium of any kind is found for men. However, Card et al. (2004) estimated 2001 premia of 4.5% for British men and 13.7% for British women, down from 16.2% and 19.5% in 1983. Blanchflower and Bryson's (2010) most recent union wage premium estimate was approximate 9% in the 1993-2006 time period, with a slight downward trend over time. Bryson et al.'s (2020) study yields a 0.06 log points premium for British women in 2004 that increases slightly in 2011, yet no premium for British men after adding controls.

Ireland's labor market system is similar to that of the United Kingdom, but firm-level bargaining takes more of an emphasis (OECD/AISA 2022). There has also been considerable change in labor union dynamics over the years (OECD/AISA 2022). Early work in the country

estimates an average union wage premium approaching (Reilly 1995) or exceeding (Callan and Reilly 1993) 20%. Turner and Flannery (2016) note that the premium has declined over time, citing declining union power as an important factor. Their results differentiate between union membership and collective bargaining coverage, and mostly find sub-10% premia. Out of the four categories examined, union members as a whole have the lowest premium at 6.7%, whereas union members who are covered by a collective agreement benefit from a 13.1% premium (Turner and Flannery 2016). Walsh's (2013) paper accords with these findings, estimating a 10% premium with cross-sectional data, yet 3% or lower with a longitudinal method. Another recent study's calculations vary between 3-11% depending on nationality, with Irish nationals earning an 8% premium and the Irish-born and immigrants receiving similar premia overall (Turner et al. 2014). Collectively, these studies find a premium between 3% and 13% in late 2000s Ireland.

4.3.4: Australia

Collective bargaining occurs at both the sector and enterprise level in Australia, although sector-level agreements are favored (OECD/AIAS 2022). Agreements are sometimes extended to ununionized employers, and there is minimal wage co-ordination that usually happens through government signals (OECD/AISA 2022). Union wage premium estimates in the country tend to be low. Studying just male workers from the early 1990s through the early 2000s, Waddoups (2005) finds a slightly rising premium between 3-5%. Cai and Liu (2008) estimate a 10% premium for males, and a 5% premium for females. Running separate cross-sectional and fixed effects regressions, Cai and Waddoups (2011) yield 8.7% and 4% premia for men and women respectively in their cross-sectional model, dropping to 5.2% and 2% each in the longitudinal specification. They conclude that the premium has stayed relatively stable over time in Australia. Nahm et al. (2017) argue that much of this work is upward biased as it does not control for

unobserved heterogeneity and/or selection bias. They estimate that the union wage effect may in fact be negative in Australia. Notwithstanding this result, most Australian studies find slightly positive effects (Nahm et al. 2017). Earlier studies found premia of 9.2% (Blanchflower 1996) and 17.2% (Christie 1992), although the latter is ‘biased’ upward due to its use of Lee’s selection-correction model.

4.3.5: Continental Europe

In many continental European countries, bargaining occurs at multiple levels (Magda et al. 2016; OECD/AISA 2022); in others, it is highly centralized (Bryson et al. 2020; OECD/AISA 2022). Bargaining coverage is frequently extended to nonunion employees (Bryson 2014). Works councils often play a notable role, too (Degrauwe 2018). Whether additional firm-level bargaining confers an extra premium is a matter of dispute, and it appears to depend on the country being studied (Plasman et al. 2007), but for the most part there is a minimal wage effect (Bryson 2014). Studies from Germany (Goerke and Pannenberg 2011; Guertzgen 2016) fail to find evidence of a union membership premium, while recent estimates in Norway are practically insignificant from zero (Bryson et al. 2020). A correlation between union density and firm-level wages has been found in Norway (Balsvik and Sæthre 2014; Barth et al. 2021), although causality is not clear in this research. Within this context of extensive bargaining coverage, many European countries have practically no union wage premia studies. Breda (2015) estimates a 2% firm-level bargaining premium in France despite most workers being covered by industry-level agreements, and notes that his is apparently the only study focusing on the union wage premium in France that controls for worker characteristics. Magda et al. (2012, 2016) focus on the Central European transitional economies of Poland, Hungary and the Czech Republic, providing some

evidence for industry-level bargaining premia particularly, but results are highly contingent on the country and year under study.

4.3.6: Japan and South Korea

Japan's union system is greatly influenced by American New Deal era legislation; the key difference is that unions are easier to form in Japan, yet no union can be granted exclusive representation, therefore any number of unions can theoretically coexist at a given firm (Tsuru and Rebitzer 1995). They are organized along enterprise lines, compared to in the United States where craft or industrial unions also operate, and aim chiefly for stable employment, the regulation of promotion rules, and co-operation with management to boost productivity (Noda and Hirano 2013). The main differences compared to the United States in the OECD/AISA (2022) database are there is substantial pattern bargaining in Japan that is guided by non-binding norms along with the presence of voluntary works councils which can informally negotiate over some aspects of working conditions. Other alternative arrangements reminiscent of unions, such as labor-management consultations and employee associations, proliferate in the country (Tsuru 2010). Many researchers have argued that this framework has resulted in relatively weak bargaining power for Japanese unions, although there is dissent from this viewpoint (Hara and Kawaguchi 2008).

Tsuru (2010) traces an upward trend for Japanese premium estimates over the years: studies using 1980s data tend toward negative union wage effects, zero effect is found in most research with early 1990s data, and significantly positive premia predominate 2000s studies. Tsuru's (2010) own regressions confirm this trend, as no significant premium is found in 1992, while a 9% premium is calculated for Japanese males in 2007, although the regressions for Japanese females still provide no evidence of a union wage premium. Ultimately, it appears that

over time Japanese unions traded employment security for wage increases (Tsuru 2010). Hara and Kawaguchi (2008) end up with similar results from a 2000-2003 pooled sample, computing a 7% premium after adding in a comprehensive amount of control variables. Thus, the Japanese union wage effect appears to have increased in the first decade of the 21st century in comparison to the 1980s and 1990s, reaching a slightly positive level.

Firm-level bargaining is dominant in South Korea and moderate wage co-ordination occurs as well (OECD/AISA 2022). Works councils are established in a more formal manner in the country compared to Japan (OECD/AISA 2022). Like Japan, enterprise unions have historically dominated (Lee 2011). Spurred by union leaders' concern over their weak bargaining power, a legislative shift towards increased sectoral bargaining has been seen, although in practice wage bargaining remains, by and large, a firm-level activity (Lee 2011). In addition to enterprise union weakness, threat effects have been cited as a potential reason for low premia in South Korea, although explanation as to why this may be more of a factor there than in other countries is not given (Joonmo and Byung You 2008; Park 1991). The union wage premium in 1990s studies in Korea was estimated in the mid-single digits (7% in Kleiner and Lee 1997; 4% in Park 1991). More recent evidence confirms the existence of a premium in the country (Choi and Ramos 2021). Joonmo and Byung You (2008) aver that the premium is usually estimated at roughly 5%, but argue it may actually be much higher.

4.4: Recent Empirical Evidence in Developing Countries

If the preceding discussion appears to be at all focused on developed, so called 'Western' countries, this is mostly due to a lack of data in developing countries, and hence a lack of union wage studies in these regions (Rios-Avila and Hirsch 2014), with few exceptions. The union wage literature has in fact had a particular focus on English speaking countries (Bryson et al.

2020; Goerke and Pannenberg 2011; Magda et al. 2016). Weak bargaining power and institutional strength in many developing countries (Freeman 2009), and extensive bargaining coverage in some developed countries have presumably weakened the incentives for union wage studies. Moreover, developing country unions are at times more engaged in political activities than collective bargaining (Freeman 2009).

4.4.1: China

Chinese unions are not independent organizations as in most other developing countries. Rather, they are hierarchically organized through the All-China Federation of Trade Unions and act as a ‘transmission belt’ between the government and labor, serving primarily as a means of maintaining social and political stability (Fang et al. 2018). In fact, unlike unions in Western countries, many union members in the country are managers (Gunderson et al. 2016). Only a minority of Chinese unions even have collective bargaining power (Fang et al. 2018) and when they do it tends to be weak (Fang and Ge 2011). Mostly, Chinese unions strive for harmonious relations between labor, management, and the party-state (Gunderson et al. 2016), with their explicit worker protection activities mainly confined to monitoring management practices to ensure compliance with government regulations and company policies (Fang and Ge 2011). However, they may still indirectly lead to increased wages by enhancing productivity (Gunderson et al. 2016).

According to Gunderson et al. (2016), prior Chinese studies use enterprise-level data, with theirs being the first to leverage the type of individual-level data commonplace in Western-based union wage research. It is therefore difficult to say exactly how Chinese union wage effects may have changed over time, but the most recent studies suggest they do have positive effects in the realm of a 6-13% premium (Ge 2007; Gunderson et al. 2016; Yao and Gunderson

2021; Yao and Zhong 2013). To the contrary, some research does not find a union wage premium in China (Lu et al. 2010).

4.4.2: Other Asian Countries

Union wage estimates in Asian countries that have not already been covered are extremely scarce. Freeman (2009), in a review of developing country wage premia, focuses almost exclusively on South Korea across his two paragraphs summarizing evidence in Asia. For India, Bhandari (2008) estimates premia of 6% for contract workers and 25% for permanent workers. Two Vietnamese studies find a premium in that country of 5% (Clarke et al. 2007) and 7% (Torm 2014), respectively. Turkish results are similar, at 9% (Duman 2011).

4.4.3: Latin America

By the standards of developing countries, Freeman (2009) posits that Mexico has the most union wage premium research. Results from the country have either fell at 5% or less, or in the range of 10-15% (Freeman 2009). A recent study of wage changes after joining a union falls into the former camp, computing a 3.7% wage premium for Mexican union joiners (Rufrancos 2019). In Brazil, estimates from a late 1990s study of the manufacturing sector yielded a premium between 5% and 7% (Freeman 2009), while newer, more general estimates varied between 15% and 18% contingent on the methodology of choice (Arbache 2008). Other results from Latin America include premia of 7.5% for Uruguay (Cassoni et al. 2011), 11.6% for Bolivia and 13.6% for Chile (Rios-Avila and Hirsch 2014). Another study finds an 18-24% premium in Chile using a selection-correction methodology (Landerretche et al. 2013).

4.4.4: Africa

Freeman (2009) concisely summarizes much of the evidence from Africa. Two Ghanaian studies estimate the premium to be 6% and 16% in that country and a paper on Cameroon estimates a 14% premium (Freeman 2009). Three late 20th century studies – from Zimbabwe, Cameroon and Senegal – yield negative union wage effects, which could be explained by government interference and/or influence (Freeman 2009). In South Africa, which has an extensive union wage literature (Bhorat et al. 2012), most estimates range from 10-20% (Freeman 2009). Several recent South African studies differ from this range. Bhorat et al. (2012) get highly unstable estimates depending on specification, peaking at 41% and hitting a low point of 6%; their preferred models land between 6-7%. Ntuli and Kwenda's (2014) South African results fall from 57% in 2001 to 42% in 2010, Ntlhola et al.'s (2019) fixed effects model yields estimates of 8-10% for men and 8-14% for women, and Kerr and Wittenberg's (2021) figures are between 27% and 38% in years with reliably comparable data.

5: Policy and Practice Implications

Without extensively reviewing the other effects of unions it is difficult to make policy prescriptions. However, policymakers' decisions can have large effects on the union wage premium. Policies surrounding the level(s) at which unions bargain (firm, industry, national, etc.), union certification, and extension of union coverage to non-members, to name a few, have critical impacts on the relative wages of unionized and nonunionized workers. With their typical wage compression strategy, unions could be an engine to enhance wage equality, and can even foster healthy relationships between employees and employers.

For employers, union wage bargaining can increase labor costs, but union voice effects can positively impact productivity and other firm characteristics. Even the threat of unions can

lead to shock effects that help modernize workplace practices, leading to further benefits. While it is impossible to say as a rule whether union formation would be a positive or negative for an employer (although commonly held management attitudes would suggest it is usually a negative), alternatives do exist that may lead to some of the mutual benefits of unionism with the advantage of added flexibility. Non-union representation, such as works councils or the inclusion of employees on corporate boards, is one alternative (see Jirjahn and Smith 2017); performance-based pay, for example piece-rate pay or stock options, is another. For workers, unions in most countries still have clearly beneficial wage impacts for all but the very skilled (whose wages are boosted less by unions relative to other workers, if at all). For unions themselves, the general declines in union membership and the wage premium are concerning and could reflect the need to re-examine organizing tactics and strategically reorient in the face of globalization and international competition, and enhance inclusivity and alternative dispute resolution to grow membership. There are also questions as to how to best serve union members, as wages, benefits, working conditions, and other facets of work are jointly bargained for. Sometimes a wage increase could come at the expense of other parts of the compensation package.

6: Avenues for Future Research

There has been ample evidence on the union wage premium over the years, but some remaining gaps could be filled. The nature of the premium and its determinants are such that they naturally evolve over time, so new studies on a periodic basis for the sake of uncovering changes are welcome additions. Many countries are lacking studies that use a common method to track the premium over time, an area of low-hanging fruit. In general, the literature is highly concentrated in certain developed countries, so novel methodologies or data sources that can

expand and deepen the geographic coverage of union wage premium research would be hugely beneficial. Some countries' results vary quite drastically, so more selective and in-depth reviews may assist in pointing out the reasons why. Country-level comparisons of premia trends and determinants would also be fruitful. On a related note, the relationship between bargaining level(s) and the union wage premium, which varies greatly from country to country, appears understudied.

The staple methodologies (OLS, fixed effects and selection-correction) have been extensively analyzed, but some of the methods in Section 4.2 could benefit from a critical eye, extensions to new countries, and/or comparisons with other techniques. Detailed analyses of the premium for different groups of workers (e.g., by race, gender, industry, or job attributes) have increased in number in recent years, and this is an area where different yet interesting breakdowns could be reasonable to think of. Precise estimates of the determinants behind the trend of union wage premium decline in developed countries are lacking, as most research finds one or more premium estimates yet does not uncover the reasons underpinning the advantageous wage effect of unions. As evidence from China demonstrates, unions can increase wages without strong bargaining power, so this may be just one piece of the puzzle. The determinants of bargaining power could be studied, as could potential trade-offs between wage and non-wage components of collective agreements and the impact of collective agreement provisions/structure on the wage premium. Work that does speak to the premium's determinants is usually qualitative and/or speculative, laying out reasons for its decline over time but not assessing their relative contribution. Research into some of the more subjective premium determinants (for example attitudes toward unionism) is lacking in general.

7: Summary

Labor unions are an important labor market institution in modern economies. Reflecting their importance is the fact that research into their effect on wages has been longstanding and prolific, finding that the average union member benefits from a wage premium relative to a comparable non-member, arguably one of the most important objectives of labour unions and one of the important reasons why workers choose to join them. Unions also compress the wage structure, having greater wage effects for lower skilled workers and those traditionally lacking bargaining power, such as racial minorities. In recent decades, union density has declined throughout the developed world, and in most countries the union wage premium has fallen as well. Multiple factors have contributed to this fall, including weakened bargaining power as a result of the decrease in unionization, globalization, international competition, technological change and a rise in the skill premium, a shift toward the service industry, and less favorable labor laws. Opposition to unions from management has possibly risen, and public sector unions, which have traditionally had less of a wage effect, are relatively more prominent.

When it comes to estimating the union wage premium, there are many challenges to face. At a basic level, many factors influence wages, and controlling for them reduces the raw wage premium as union workers tend to possess other qualities that lead to higher pay independent of union status. Potential endogeneity and selection biases must be considered in these studies, as unions may select the firms they organize, certain types of workers may select into unions, and firms may have some leeway to select their workers. Workers may also differ in ways unobservable to researchers. The three cardinal regression methodologies used in union wage premium studies are ordinary least squares, longitudinal (usually fixed effects), and selection-correction techniques, although other methodologies, such as propensity matching and regression

discontinuity models, hold empirical value as well. In addition to the theoretical contribution of union impact research (monopoly face and voice face of unions; optimal and alternative bargaining model), research methodologies invented by labor economists to study union wage effects have been widely used by other subfields of economics and other social sciences disciplines and present themselves as important contributions to academic research.

Union functions and union wage premia vary country-to-country, but a lot of recent estimates land in the range of roughly 0-20%. Public policy decisions with respect to labor unions, and labor policy in general, have profound impacts on union effectiveness, causing a substantial amount of the geographic variation. Policymakers can govern the rules of union formation, representation, political activities, dues payment, etc. Overall, the union wage premium has seen a downward trend over time due to numerous aforementioned factors. Studies from most countries find a modest to moderate premium after controlling for other factors that impact wages. There are some differences between developed and developing countries. Notably, while there is debate, globalization appears more likely to boost the premium in the developing world while reducing the premium in developed countries. Many results from developing countries find similar union wage premia to results in developed country research, with substantial exceptions, even in countries where bargaining power is weak or nonexistent. The mechanisms through which unions exert strong wage impact are worthy of further investigation.

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References

- Abowd JM, Farber HS (1982) Job queues and the union status of workers. *Industrial & Labor Relations Review* 35: 354-367.
- Abraham F, Konings J, Vanormelingen S (2009) The effect of globalization on union bargaining and price-cost margins of firms. *Review of World Economics* 145: 13-36
- Açikgöz, ÖT, Kaymak B (2014) The rising skill premium and deunionization. *Journal of Monetary Economics* 63: 37-50
- Addison JT, Portugal P, de Almeida Vilares H (2022) Union membership density and wages: The role of worker, firm, and job-title heterogeneity. *Journal of Econometrics*.
- Anner M (2011) The impact of international outsourcing on unionization and wages: Evidence from the apparel export sector in Central America. *Industrial & Labor Relations Review* 64: 305-322
- Arbache JS (2008) Unions and the labor market in Brazil. In: Almeida J (ed.) *Brazil in focus: Economic, political and social issues*. Nova Publishers, Hauppauge, p 123-154
- Ashenfelter O (1972) Racial discrimination and trade unionism. *The Journal of Political Economy* 80: 435-464
- Ashenfelter O, Pencavel JH (1969) American trade union growth: 1900–1960. *The Quarterly Journal of Economics* 83: 434-448
- Ashraf J (1990) Recent trends in the union wage premium. *Journal of Labor Research* 11: 435-451
- Ashraf J (1992) Union wage premiums in an instrumental variables framework. *Journal of Labor Research* 13: 231-236

- Bahrami B, Bitzan JD, Leitch JA (2008) Union worker wage effect in the public sector. *Journal of Labor Research* 30: 35-51
- Balsvik R, Sæthre M (2014) Rent sharing with footloose production: Foreign ownership and wages revisited. NHH discussion paper SAM 30/14, Bertgen. <https://openaccess.nhh.no/nhh-xmlui/bitstream/handle/11250/222551/Discussionpaper.pdf?sequence=1&isAllowed=y>. Accessed 9 May 2022
- Barth E, Bryson A, Dale-Olsen H (2021) Union density effects on productivity and wages. *The Economic Journal (London)* 130: 1898-1936
- Beladi H, Chao CC, Hollas D (2013) Does globalization weaken labor unions in developing countries?. *The Journal of International Trade & Economic Development* 22: 562-571
- Benjamin D, Gunderson M, Lemieux T, Riddell WC (2012) *Labour market economics: Theory, evidence, and policy in Canada* (seventh edition). McGraw-Hill Ryerson, Toronto
- Benjamin D, Gunderson M, Lemieux T, Riddell WC (2017) *Labour market economics: Theory, evidence, and policy in Canada* (eighth edition). McGraw-Hill Ryerson, Toronto
- Bhandari AK (2008) Union membership effect on wage premiums: Evidence from organized manufacturing industries in India. IZA discussion paper no. 3747, Bonn. <https://www.iza.org/publications/dp/3747/union-membership-effect-on-wage-premiums-evidence-from-organized-manufacturing-industries-in-india#:~:text=The%20estimated%20wage%20premiums%20for,higher%20premium%20for%20their%20members>. Accessed 9 May 2022

- Bhorat H, Sumayya G, Van Der Westhuizen C (2012) Institutional wage effects: Revisiting union and bargaining council wage premia in South Africa. *The South African Journal of Economics* 80: 400-414
- Bilginsoy C (2013) Union wage gap in the U.S. construction sector: 1983-2007. *Industrial Relations (Berkeley)* 52: 677-701
- Blackburn ML (2007) Estimating wage differentials without logarithms. *Labour Economics* 14: 73-98
- Blackburn ML (2008) Are union wage differentials in the United States falling? *Industrial Relations (Berkeley)* 47: 390-418
- Blanchflower D (1984) Union relative wage effects: a cross-section analysis using establishment data. *British Journal of Industrial Relations* 22: 311-332
- Blanchflower D (1986) What effect do unions have on relative wages in Great Britain? *British Journal of Industrial Relations* 24: 195-204
- Blanchflower DG (1996) The role and influence of trade unions in the OECD. Bureau of International Labor Affairs, U.S. Department of Labor, Washington, D.C.
<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.589.6691&rep=rep1&type=pdf>.
Accessed 9 May 2022
- Blanchflower DG (1997) Changes over time in union relative wage effects in Great Britain and the United States. National Bureau of Economic Research working paper no. 6100, Cambridge, U.S.
<https://www.nber.org/papers/w6100>. Accessed 9 May 2022
- Blanchflower DG, Bryson A (2004a) What effect do unions have on wages now and would Freeman and Medoff be surprised? *Journal of Labor Research* 25: 383-414

- Blanchflower D, Bryson A (2004b) The union wage premium in the US and the UK. London School of Economics, London
- Blanchflower DG, Bryson A (2010) The wage impact of trade unions in the UK public and private sectors. *Economica* (London) 77: 92-109
- Blanchflower DG, Artz B, Bryson A (2021) Unions increase job satisfaction in the United States. National Bureau of Economic Research working paper no. 28717, Cambridge, U.S.
<https://www.nber.org/papers/w28717>. Accessed 9 May 2022
- Booth AL (1995) The economics of the trade union. Cambridge University Press, Cambridge, U.K.
- Braendle T (2017) Flexible collective bargaining agreements: Still a moderating effect on works council behaviour? *Managerial and Decision Economics* 38: 1137-1153
- Bratsberg B, Ragan JF (2002) Changes in the union wage premium by industry. *Industrial & Labor Relations Review* 56: 65-83
- Breda T (2015) Firms' rents, workers' bargaining power and the union wage premium. *The Economic Journal* (London) 125: 1616-1652
- Bruno R, Zullo R, Manzo F, Dickson A (2015) The economic effects of adopting a right-to-work law: Implications for Illinois. *Labor Studies Journal* 40: 319-361
- Bryson A (2002) The union membership wage premium: An analysis using propensity score matching. Centre for Economic Performance discussion paper 0530, London School of Economics, London. <https://ideas.repec.org/p/cep/cepdps/dp0530.html>. Accessed 9 May 2022
- Bryson A (2014) Union wage effects. *IZA World of Labour* 2014 35: 1-10

- Bryson A, Ebbinghaus B, Visser J (2011) Introduction: Causes, consequences and cures of union decline. *European Journal of Industrial Relations* 17: 97-105
- Bryson A, Dale-Olsen H, Nergaard K (2020) Gender differences in the union wage premium? A comparative case study. *European Journal of Industrial Relations* 26: 173-190
- Budd JW, Na, IG (2000) The union membership wage premium for employees covered by collective bargaining agreements. *Journal of Labor Economics* 18: 783-807
- Cai L, Liu AYC (2008) Union wage effects in Australia: Is there variation along the distribution? *The Economic Record* 84: 496-510
- Cai L, Waddoups CJ (2011) Union wage effects in Australia: Evidence from panel data. *British Journal of Industrial Relations* 49: s279-s305
- Callan T, Reilly B (1993) Unions and the wage distribution in Ireland. *The Economic and Social Review* 24: 297-312
- Callaway B, Collins WJ (2018) Unions, workers, and wages at the peak of the American labor movement. *Explorations in Economic History* 68: 95-118
- Campello M, Gao J, Qiu J, Zhang Y (2018) Bankruptcy and the cost of organized labor: Evidence from union elections. *The Review of Financial Studies* 31: 980-1013
- Campolieti M (2018) Matching and inverse propensity weighting estimates of the union wage premium: Evidence from Canada, 1997–2014. *Industrial Relations (Berkeley)* 57: 101-130
- Campolieti M, Gomez R, Gunderson M (2012) Managerial hostility and attitudes towards unions: A Canada-US comparison. *Journal of Labor Research* 34: 99-119

- Card D (1996) The effect of unions on the structure of wages: A longitudinal analysis. *Econometrica* 64: 957-979
- Card D, Lemieux T, Riddell CW (2020) Unions and wage inequality: The roles of gender, skill and public sector employment. *The Canadian Journal of Economics* 53: 140-173
- Card D, Lemieux T Riddell WC (2004) Unions and wage inequality. *Journal of Labor Research* 25: 519-559
- Cassoni A, Fachola G, Labadie GJ (2011) The economic effects of unions in Latin America: Their impact on wages and the economic performance of firms in Uruguay. Inter-American Development Bank Latin American Research Network Working Paper #R-466, Washington, D.C. <https://publications.iadb.org/publications/english/document/The-Economic-Effects-of-Unions-in-Latin-America-Their-Impact-on-Wages-and-the-Economic-Performance-of-Firms-in-Uruguay.pdf>. Accessed 9 May 2022
- Chava S, Danis A, Hsu A (2020) The economic impact of right-to-work laws: Evidence from collective bargaining agreements and corporate policies. *Journal of Financial Economics* 137: 451-469
- Chernozhukov V, Fernández - Val I, Hahn J, Newey W (2013) Average and quantile effects in nonseparable panel models. *Econometrica* 81: 535-580
- Choi H, Ramos R (2021) The union wage premium in a segmented labor market: New evidence from Korea. *Journal of the Asia Pacific Economy*
- Christie V (1992) Union wage effects and the probability of union membership. *The Economic Record* 68: 43-56

- Clarke S, Lee CH, Chi DQ (2007) From rights to interests: The challenge of industrial relations in Vietnam. *Journal of Industrial Relations* 49: 545-568
- Clemens J, Veldhuis N, Karabegovic A (2005) Explaining Canada's high unionization rates. Fraser Alert: Labour Market Series, Fraser Institute, Vancouver.
<https://www.fraserinstitute.org/sites/default/files/explaining-canadas-high-unionization-rates.pdf>.
Accessed 9 May 2022
- Coombs CK, Newman RJ, Cebula RJ, White ML (2015) The bargaining power of health care unions and union wage premiums for registered nurses. *Journal of Labor Research* 36: 442-461
- Creane A, Davidson C (2011) The trade-offs from pattern bargaining with uncertain production costs. *European Economic Review* 55: 246-262
- Crenshaw K (1989) Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, 1989.
- Curthoys M (2004) *Governments, labour, and the law in mid-Victorian Britain: The trade union legislation of the 1870s*. Oxford University Press, Oxford
- Dahl CM, le Maire D., Munch JR (2013) Wage dispersion and decentralization of wage bargaining. *Journal of Labor Economics* 31: 501-533
- Degrauwe J, Wisskirchen G, Ormai G et al (2018) *Employee representation and information, consultation and co - determination rights in Europe*. Thomson Reuters, London.
[https://uk.practicallaw.thomsonreuters.com/w-017-3200?transitionType=Default&contextData=\(sc.Default\)](https://uk.practicallaw.thomsonreuters.com/w-017-3200?transitionType=Default&contextData=(sc.Default)). Accessed 9 May 2022

- Devinatz VG (2011) The continuing controversy over right-to-work laws in the early twenty-first century. *Employee Responsibilities and Rights Journal* 23: 287-293
- DiNardo J, Lee DS (2004) Economic impacts of new unionization on private sector employers: 1984–2001. *The Quarterly Journal of Economics* 119: 1383-1441
- Duncan GM, Leigh DE (1980) Wage determination in the union and nonunion sectors: A sample selectivity approach. *Industrial & Labor Relations Review* 34: 24-34
- Duncan GM, Leigh DE (1985) The endogeneity of union status: An empirical test. *Journal of Labor Economics* 3: 385-402
- Ellguth P, Gerner HD, Stegmaier J (2014) Wage effects of works councils and opening clauses: The German case. *Economic and Industrial Democracy* 35: 95-113
- Emmenegger P, Graf L, Strebler A (2020) Social versus liberal collective skill formation systems? A comparative-historical analysis of the role of trade unions in German and Swiss VET. *European Journal of Industrial Relations* 26: 263-278
- Eren O (2007) Measuring the union-nonunion wage gap using propensity score matching. *Industrial Relations (Berkeley)* 46: 766-780
- Fang T, Ge Y (2012) Unions and firm innovation in China: Synergy or strife? *China Economic Review* 23: 170-180
- Fang T, Heywood JS (2006) Unionization and plant closure in Canada. *The Canadian Journal of Economics* 39: 1173-1194
- Fang T, Verma A (2002) Union wage premium. *Perspectives on Labour and Income*, Statistics Canada, Ottawa: 17-23

- Fang T, Ge Y, Fan Y (2018) Unions and the productivity performance of multinational enterprises: Evidence from China. *Asian Business & Management* 18: 281-300
- Farber HS (1989) Trends in worker demand for union representation. *The American Economic Review* 79: 166-171
- Firpo SP, Fortin NM, Lemieux T (2018) Decomposing wage distributions using recentered influence function regressions. *Econometrics* 6: 28-
- Forth J, Bryson A (2019) State substitution for the trade union good: The case of paid holiday entitlements. *Journal of Participation and Employee Ownership* 2: 5-23
- Frandsen BR (2012) Why unions still matter: The effects of unionization on the distribution of employee earnings.
https://www.researchgate.net/publication/265797596_Why_Unions_Still_Matter_The_Effects_of_Unionization_on_the_Distribution_of_Employee_Earnings. Accessed 9 May 2022
- Frandsen BR (2021) The surprising impacts of unionization: Evidence from matched employer-employee data. *Journal of Labor Economics* 39: 861-894
- Freeman RB (1980) Unionism and the dispersion of wages. *Industrial & Labor Relations Review* 34: 3-23
- Freeman RB (1981) The effect of unionism on fringe benefits. *Industrial & Labor Relations Review* 34: 489-509
- Freeman RB (1984) Longitudinal analyses of the effects of trade unions. *Journal of Labor Economics* 2: 1-26

- Freeman RB (1986) The effect of the union wage differential on management opposition and union organizing success. *The American Economic Review* 76: 92-96
- Freeman RB (2009) Labor regulations, unions, and social protection in developing countries: Market distortions or efficient institutions?
- Freeman RB, Kleiner MM (1999) Do unions make enterprises insolvent? *Industrial & Labor Relations Review* 52: 510-527
- Freeman RB, Medoff JL (1981) The impact of the percentage organized on union and nonunion wages. *The Review of Economics and Statistics* 63: 561-572
- Freeman RB, Medoff JL (1984) What do unions do? Basic Books
- Gabriel PE, Schmitz S (2014) A longitudinal analysis of the union wage premium for US workers. *Applied Economics Letters* 21: 487-489
- Garloff A, Guertzgen N (2012) Collective wage contracts, opt-out clauses, and firm wage differentials: Evidence from linked employer-employee data. *Industrial Relations (Berkeley)* 51: 731-748
- Garnero A (2021) The impact of collective bargaining on employment and wage inequality: Evidence from a new taxonomy of bargaining systems. *European Journal of Industrial Relations* 27: 185-202
- Ge Y (2007) What do unions do in China? SSRN.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1031084. Accessed 9 May 2022
- Goerke L, Pannenberg M (2011) Trade union membership and dismissals. *Labour Economics* 18: 810-821

- Gomez R, Lamb D (2016) Unions and traditionally disadvantaged workers: Evidence from union wage premiums in Canada. *E-Journal of International and Comparative Labour Studies* 5: 1-21
- Gomez R, Lamb D (2019) Unions and non-standard work: Union representation and wage premiums across non-standard work arrangements in Canada, 1997–2014. *Industrial & Labor Relations Review* 72: 1009-1035
- Graham BS, Hahn J, Poirier A, Powell JL (2018) A quantile correlated random coefficients panel data model. *Journal of Econometrics* 206: 305-335
- Granqvist L, Regner H (2008) Decentralized wage formation in Sweden. *British Journal Of Industrial Relations* 46: 500-520
- Guertzgen N (2016) Estimating the wage premium of collective wage contracts: Evidence from longitudinal linked employer-employee data. *Industrial Relations (Berkeley)* 55: 294-322
- Gunderson M, Hyatt D (2001) Union-management relations in Canada. In: Gunderson M, Ponak A, Taras D (eds) *Union-management relations in Canada*, 4th edn. Addison-Wesley Longman, Don Mills, 385-413
- Gunderson M, Lee BY, Wang H (2016) Union pay premium in China: An individual-level analysis. *International Journal of Manpower* 37: 606-627
- Hamermesh DS (2020) H. Gregg Lewis: Perhaps the father of modern labor economics. IZA discussion paper no. 13551, Bonn. <https://www.iza.org/publications/dp/13551/h-gregg-lewis-perhaps-the-father-of-modern-labor-economics>. Accessed 9 May 2022
- Hara H, Kawaguchi D (2008) The union wage effect in Japan. *Industrial Relations (Berkeley)* 47: 569-590

Hashimzade N, Myles G, Black J (2017) A dictionary of economics. Oxford University Press, Oxford

Heckman J (1976) The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. In: Berg SV (ed) Annals of Economic and Social Measurement 5, National Bureau of Economic Research, Cambridge, U.S., p 475-492

Hirsch BT (2004) Reconsidering union wage effects: Surveying new evidence on an old topic. Journal of Labor Research 25: 233-266

Hirsch BT, Addison JT (1986) The economic analysis of unions: New approaches and evidence. Allen and Unwin, Boston

Hirsch BT, MacPherson DA (2003) Union membership and coverage database from the current population survey: Note. Industrial & Labor Relations Review 56: 349-354

Hirsch BT, Schumacher EJ (1998) Unions, wages, and skills. The Journal of Human Resources 33: 201-219

Hirsch BT, Schumacher EJ (2001) Private sector union density and the wage premium: Past, present, and future. Journal of Labor Research 22: 487-518

Hirsch BT, Schumacher EJ (2004) Match bias in wage gap estimates due to earnings imputation. Journal of Labor Economics 22: 689-722

Ichniowski C, Zax JS (1991) Right-to-work laws, free riders, and unionization in the local public sector. Journal of Labor Economics 9: 255-275

Jirjahn U, Smith SC (2017) Nonunion employee representation: Theory and the German experience with mandated works councils. IZA discussion paper no. 11066, Bonn.

<https://www.iza.org/publications/dp/13551/h-gregg-lewis-perhaps-the-father-of-modern-labor-economics>. Accessed 9 May 2022

Joonmo, C, Byung You C (2008) Exploring reasons why cross-section analysis underestimates the union premium in Korea. *Applied Economics Letters* 15: 395-398

Judzik D, Sala H (2013) Productivity, deunionization and trade: Wage effects and labour share implications. *International Labour Review* 152: 205-236

Kerr A, Wittenberg M (2021) Union wage premia and wage inequality in South Africa. *Economic Modelling* 97: 255-271

Kerrissey J, Meyers N (2021) Public-sector unions as equalizing institutions: Race, gender, and earnings. *Industrial & Labor Relations Review*: 1979392110569-

Kirmanoglu H, Baslevent C (2012) Using basic personal values to test theories of union membership. *Socio-Economic Review* 10: 683-703

Kleiner MM, Lee YM (1997) Works councils and unionization: Lessons from South Korea. *Industrial Relations (Berkeley)* 36: 1-16

Knepper, M (2020) From the fringe to the fore: Labor unions and employee compensation. *The Review of Economics and Statistics* 102: 98-112

Koevoets W (2007) Union wage premiums in Great Britain: Coverage or membership? *Labour Economics* 14: 53-71

Kreickemeier U, Meland F (2013) Non-traded goods, globalization and union influence. *Economica (London)* 80: 774-792

- Kuhn P, Sweetman A (1998) Wage loss following displacement: The role of union coverage. *Industrial & Labor Relations Review* 51: 384-400
- Kulkarni A, Hirsch BT (2021) Revisiting union wage and job loss effects using the displaced worker surveys. *Industrial & Labor Relations Review* 74: 948-976
- Landerretche O, Lillo N, Puentes E (2013) The union effect on wages in Chile: A two-stage approach using panel data. *Labour (Rome, Italy)* 27: 164-191
- Lee DS, Mas A (2012) Long-run impacts of unions on firms: New evidence from financial markets, 1961-1999. *The Quarterly Journal of Economics* 127: 333-378
- Lee J (2011) Between fragmentation and centralization: South Korean industrial relations in transition. *British Journal of Industrial Relations* 49: 767-791
- Lee LF (1978) Unionism and wage rates: A simultaneous equations model with qualitative and limited dependent variables. *International Economic Review (Philadelphia)* 19: 415-433
- Lewis HG (1963) *Unionism and relative wages in the United States: An empirical inquiry*. University of Chicago Press, Chicago
- Lewis HG (1986) *Union relative wage effects: A survey*. University of Chicago Press, Chicago
- Lewis HG (1990) Union/nonunion wage gaps in the public sector. *Journal of Labor Economics* 8: S260-S328
- Lu Y, Tao Z, Wang Y (2010) Union effects on performance and employment relations: Evidence from China. *China Economic Review* 21: 202-210
- Magda I, Marsden DW, Moriconi S (2012) Collective agreements, wages, and firms' cohorts: Evidence from Central Europe. *Industrial & Labor Relations Review* 65: 607-629

- Magda I, Marsden DW, Moriconi S (2016) Lower coverage but stronger unions? Institutional changes and union wage premia in Central Europe. *Journal of Comparative Economics* 44: 638-656
- Medoff JL, Freeman RB (1982) The impact of collective bargaining: Can the new facts be explained by monopoly unionism? National Bureau of Economic Research working paper no. 0837, Cambridge, U.S. <https://www.nber.org/papers/w0837>. Accessed 9 May 2022
- Moore WJ (1998) The determinants and effects of right-to-work laws: A review of the recent literature. *Journal of Labor Research* 19: 445-469
- Morin A (2017) Cyclicity of wages and union power. *Labour Economics* 48: 1-22
- Mullola S, Hakulinen C, Presseau J et al (2018) Personality traits and career choices among physicians in Finland: Employment sector, clinical patient contact, specialty and change of specialty. *BMC Medical Education* 18: 52-
- Nahm D, Dobbie M, MacMillan C (2017) Union wage effects in Australia: An endogenous switching approach. *Applied Economics* 49: 3927-3942
- Naylor R, Raaum O (1993) The open shop union, wages, and management opposition. *Oxford Economic Papers* 45: 589-604
- Noda T, Hirano D (2013) Enterprise unions and downsizing in Japan before and after 1997. *Journal of the Japanese and International Economies* 28: 91-118
- Ntlhola MA, Kwenda P, Ntuli M (2019) A distributional analysis of union-wage effects in South Africa: Evidence from panel data. *Development Southern Africa (Sandton, South Africa)* 36: 309-328
- Ntuli M, Kwenda P (2014) Labour unions and wage inequality among African men in South Africa. *Development Southern Africa (Sandton, South Africa)* 31: 322-346

- Oaxaca RL (1973) Male-female wage differentials in urban labor markets. *International Economic Review* (Philadelphia) 14: 693-709
- Oaxaca RL (1975) Estimation of union/nonunion wage differentials within occupational/regional subgroups. *The Journal of Human Resources* 10: 529-537
- Parker C, Rees J (2013) Membership growth at a time of union decline: Usdaw, organizing and leadership. *Transfer* (Brussels, Belgium) 19: 521-538
- Park YB (1991) Union/nonunion wage differentials in the Korean manufacturing sector. *International Economic Journal* 5: 79-91
- Parolin Z (2021) Automation, occupational earnings trends, and the moderating role of organized labor. *Social Forces* 99: 921-946
- Parsley CJ (1980) Labor union effects on wage gains: A survey of recent literature. *Journal of Economic Literature* 18: 1-31
- Peng F, Kang L (2013) Labor market institutions and skill premiums: An empirical analysis on the UK, 1972-2002. *Journal of Economic Issues* 47: 959-981
- Plasman R, Rusinek M, Rycx F (2007) Wages and the bargaining regime under multi-level bargaining: Belgium, Denmark and Spain. *European Journal of Industrial Relations* 13: 161-180
- Pontusson J (2013) Unionization, inequality and redistribution. *British Journal of Industrial Relations* 51: 797-825
- Reed WR (2003) How right-to-work laws affect wages. *Journal of Labor Research* 24: 713-730
- Reilly B (1995) Union and gender wage gap estimates for young workers in Ireland – A note. *The Economic and Social Review* 26: 221-231

- Renaud S (1998) Unions, wages and total compensation in Canada: An empirical study. *Relations Industrielles* (Québec, Québec) 53: 710-729
- Rios-Avila F, Hirsch BT (2014) Unions, wage gaps, and wage dispersion: New evidence from the Americas. *Industrial Relations* (Berkeley) 53: 1-27
- Robinson C (1989) The joint determination of union status and union wage effects: Some tests of alternative models. *The Journal of Political Economy* 97: 639-667
- Roche WK, Gormley T (2020) The durability of coordinated bargaining: Crisis, recovery and pay fixing in Ireland. *Economic and Industrial Democracy* 41: 481-505
- Rosenbloom JL, Ash RA, Dupont B, Coder L (2008) Why are there so few women in information technology?: Assessing the role of personality in career choices. *Journal of Economic Psychology* 29: 543-554
- Rosenfeld J, Kleykamp M (2012) Organized labor and racial wage inequality in the United States. *The American Journal of Sociology* 117: 1460-1502
- Rosen S (1969) Trade union power, threat effects and the extent of organization. *The Review of Economic Studies* 36: 185-196
- Rufrancos HG (2019) Are there gains to joining a union? Evidence from Mexico. *British Journal of Industrial Relations* 57: 676-712
- Rutherford D (2013) Craft union. In: Rutherford D (ed) *Routledge dictionary of economics*, 3rd edn. Routledge, Abingdon, p 126
- Schnabel C (2003) Determinants of trade union membership. In: Addison J, Schnabel C (eds) *International handbook of trade unions*. Edward Elgar, Cheltenham, p 13-43

- Schnabel C (2013) Union membership and density: Some (not so) stylized facts and challenges.
European Journal of Industrial Relations 19: 255-272
- Simms M (2013) Workplace trade union activists in UK service sector organising campaigns:
Workplace trade union activists. Industrial Relations Journal 44: 373-388
- Slichter SH (1941) Union policies and industrial management. The Brookings institution, Washington,
D.C.
- Sobel RS (1995) Empirical evidence on the union free-rider problem: Do right-to-work laws matter?
Journal of Labor Research 16: 347-365
- Stewart MB (1987) Collective bargaining arrangements, closed shops and relative pay. The Economic
Journal (London) 97: 140-156
- Tapia M, Lee TL, Filipovitch M (2017) Supra-union and intersectional organizing: An examination of
two prominent cases in the low-wage US restaurant industry. Journal of Industrial Relations 59:
487-509
- Torm N (2014) The role of trade unions in Vietnam: A case study of small and medium enterprises.
Journal of International Development 26: 207-221
- Trampusch C (2010) The welfare state and trade unions in Switzerland: An historical reconstruction of
the shift from a liberal to a post-liberal welfare regime. Journal of European Social Policy 20:
58-73
- Trick S, Peoples J (2012) Union compensation following intrastate deregulation: Evidence from the US
trucking industry. Transport Policy 24: 10-18

- Troy L, Sheflin N (1985) Union sourcebook: Membership, finances, structure, directory. Industrial Relations Data and Information Services, West Orange
- Tsuru T (2010) The union wage premium, voice, and nonunion workers' attitudes: Before and after Japan's lost decade, volume 11. In: Eriksson T (ed) Advances in the economic analysis of participatory & labor-managed firms. Emerald Group Publishing Limited, Bingley, p 161-204
- Tsuru T, Rebitzer JB (1995) The limits of enterprise unionism: Prospects for continuing union decline in Japan. *British Journal of Industrial Relations* 33: 459-492
- Turner T, Cross C, O'Sullivan M (2014) Does union membership benefit immigrant workers in 'hard times'? *Journal of Industrial Relations* 56: 611-630
- Turner T, Flannery D (2016) Did partnership in Ireland deliver for all workers? Unions and earnings. *Employee Relations* 38: 946-960
- Van der Meer M, van Os van den Abeelen R, Visser J (2009) The focus of the new trade union: Opinions of members and non-members regarding social differences and trade union priorities in the Netherlands. *Transfer (Brussels, Belgium)* 15: 439-460
- Waddoups CJ (2005) Trade union decline and union wage effects in Australia. *Industrial Relations (Berkeley)* 44: 607-624
- Waddoups CJ (2008) Unions and wages in Australia: Does employer size matter? *Industrial Relations (Berkeley)* 47: 136-144
- Walsh F (2013) The union wage effect and ability bias: Evidence from Ireland. *Economics Letters* 119: 296-298

- Williams WE (2011) *Race & economics: How much can be blamed on discrimination?* Hoover Institution Press, Stanford
- Wooden M (2001) Union wage effects in the presence of enterprise bargaining. *The Economic Record* 77: 1-18
- Wunnava PV, Peled NO (1999) Union wage premiums by gender and race: Evidence from PSID 1980–1992. *Journal of Labor Research* 20: 415-423
- Yao Y, Gunderson M (2021) Do local union strategies explain the (unexpected) union pay premium in China? *International Journal of Manpower*.
- Yao Y, Zhong N (2013) Unions and Workers' Welfare in Chinese Firms. *Journal of Labor Economics* 31: 633-667
- Zhang T (2019) Effects of occupational licensing and unions on labour market earnings in Canada. *British Journal of Industrial Relations* 57: 791-817
- Zhang T, Gunderson M (2020) Impact of occupational licensing on wages and wage inequality: Canadian evidence 1998–2018. *Journal of Labor Research* 41: 338-351
- Zullo R (2021) Does the open shop harm union collective action? *Industrial Relations Journal* 52: 183-197