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ECONOMIC GROWTH AND INNOVATION

The Laws of Unintended Consequence: The Effect of Labour Legislation on Wages and Strikes

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In this issue...

When governments intervene in labour relations, whether through compulsory arbitration, “back-to-work” legislation, union certification rules, or bans on replacement workers during strikes, they should weigh the unintended consequences.

THE STUDY IN BRIEF

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Canadian governments, both federal and provincial, heavily regulate labour relations between unions and employers. In both the private and public sectors, this government intervention has unintended consequences on wages and strikes.

As governments across Canada tackle their deficits, controlling labour costs will potentially be at the top of their agendas. This makes analyzing the effectiveness of government interventions all the more important. We find that legislation requiring compulsory arbitration in labour disputes involving public employees has increased wages by about 1.2 percent per settlement. Although politicians might view strikes in such situations as politically costly, they need to consider the long-term effects of arbitrated settlements; namely, higher labour costs that are borne by the taxpayer.

Once strikes are under way, many governments have also taken steps to end them. However, we find that resort to “back-to-work” legislation reduces the likelihood of a freely settled contract in the next round of negotiations, perpetuating the cycle of government intervention.

Two provinces – British Columbia and Quebec – have bans on using replacement workers during strikes, and a similar law has been proposed federally. The long-term effect of replacement worker bans is to increase strike length and duration while reducing investment, wages and employment. Similarly, the practice of providing reinstatement rights for striking workers has reduced wages while causing strikes to be more frequent and longer. The federal and provincial governments with these laws in place should recognize their economic costs and factor these unintended effects into any cost benefit analysis of the legislation.

For their part, unions have been seeking to get rid of secret ballots for certification votes since they view this change as a way to ease union formation. Although removing secret ballots would likely increase unionized-worker wages, we argue this would be at the cost of more strikes.

This *Commentary* provides policymakers with a fresh perspective on their potential actions and consequences in the minefield of labour disputes. Whether governments seek to shift the balance of labour-employer power, end work stoppages or prevent them in the first place, policymakers should weigh the unintended consequences before acting.

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INDEPENDENT • REASONED • RELEVANT

How employers and workers represented by unions, in both the private and public sectors, agree on the terms of work is determined by provincial and federal laws and regulations. This encompasses rules that govern how unions operate, work stoppages, and the process of collective bargaining.

Strikes, lockouts, and other outcomes of employer-employee negotiations, however, affect not just unionized employees – about one in three working Canadians – but reverberate well beyond the negotiating parties. Strikes in some public services can endanger public safety and have significant economic costs. Private-sector settlements are important because labour costs are a key factor of economic competitiveness; legislation that influences wages or the likelihood of a labour disruption may affect the competitiveness of a firm relative to that of firms in other jurisdictions.

Governments in Canada have taken different legislative paths with respect to making it more or less difficult for employees to form a union or go on strike. Some governments have also taken measures to prohibit the use of temporary workers to replace workers on strike or have made it easier for workers to return to work after a strike. Laws that govern employee-employer labour relations sometimes are harshly criticized by both employer and employee groups. These laws have numerous qualitative interpretations that suggest they may have a large range of effects. However, there is only limited quantitative research on the effects of these laws on workers and employers or on the economy as a whole.

Nearly every strike by public employees receives considerable public attention, and the hardships faced by those who use strike-affected services are often significant. Governments often remove the right to strike entirely by requiring disputes to be resolved by compulsory arbitration, or they attempt to moderate the effects of a strike by declaring that certain services are “essential” and therefore cannot be fully withdrawn, although labour stoppages may still occur. Governments also sometimes intervene with “back-to-work” legislation to force an end to a dispute. Such government measures, however, often have indirect consequences. For instance, one of the most important effects of labour relations laws in the public sector is on wages, which in 2007 amounted to \$161 billion (Statistics Canada 2007), representing (along with benefits) approximately 70 percent of total public-sector costs (Eaton 2007). A small change of, say, 0.5 percent in all public-sector collective agreements, therefore, would increase or decrease total public-sector costs by \$800 million. Other unforeseen effects of public-sector labour relations laws include potentially longer strikes and labour disruptions such as work-to-rule, illegal strikes, and slowdowns.

By investigating the lessons from previous governments’ changes to labour legislation, we intend this *Commentary* – which focuses on legislation governing collective bargaining, labour disputes, and how employees become unionized¹ – to provide a more complete examination of the consequences of such labour legislation than previously available to policymakers.²

To preview the results, we find that banning strikes increases public-sector wage levels appreciably. Bans on temporary replacement workers lower wages, contrary to previous

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- 1 We do not examine employment standards or health and safety-related issues directed by legislation. As well, we do not take into account the legal effects of Supreme Court rulings or International Labour Organization decisions defining freedom of association.
- 2 Governments’ ability to intervene in collective bargaining disputes may well be limited by the 2007 decision of the Supreme Court of Canada (*Health Services and Support-Facilities Subsector Bargaining Assn. v. British Columbia*, 2007 S.C.C. 27), which found that collective bargaining is included in freedom of association in the Canadian Charter of Rights and Freedoms.

evidence, and increase the likelihood and length of strikes, as do reinstatement rights for striking workers. Allowing union certification only through a secret ballot decreases the number of strikes and wages of unionized employees. We also find that emergency back-to-work legislation has a chilling effect on negotiations in subsequent bargaining rounds.

Jurisdictions with reinstatement rights for striking workers – which include the federal government and all provinces except British Columbia, New Brunswick, Nova Scotia, and Newfoundland and Labrador – should recognize that such legislation has the unintended effect of increasing the length of strikes while lowering wages.

Provinces that are considering removing the right to strike of public employees – be they transit workers, emergency workers, medically related staff, or otherwise – and requiring all disputes to go to arbitration should know that such action likely would increase wages. Likewise, provinces that are looking to reduce labour costs in bargained settlements, as Ontario has recently stated, should consider removing the requirement that disputes go to arbitration as a way of reducing wage costs. Lastly, we recommend that any government that ends ongoing work stoppages with back-to-work legislation – as Ontario recently did for employees of the Toronto Transit Commission and York University, and British Columbia did for paramedics – should recognize that such action reduces the probability of reaching future agreements through normal bargaining processes and increases the likelihood that they will have to rely on this thorny, intrusive instrument again in the future.

Unions and Strikes in Canada

Before discussing the effect of labour legislation on the Canadian economy, we must first consider the facts on unionization and labour action in Canada.

Unions

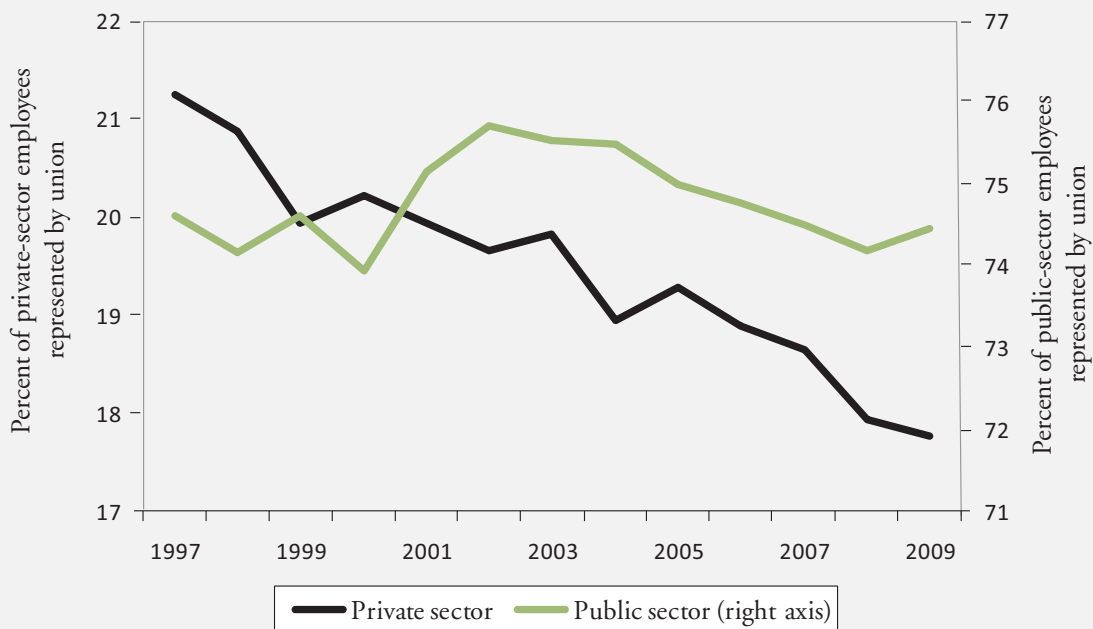
The fortunes and future prospects of unions have changed in Canada over the past 30 years. The rate of collective bargaining coverage – the percentage of workers who are represented by unions – has fallen in the private sector, from a peak of 21 percent in 1997 to 18 percent in 2009 (Figure 1).³ Public-sector union coverage, which, at about 75 percent, is much higher than in the private sector, has recently returned to the level of the 1990s. The overall union coverage rate, including both public- and private-sector workers, fell from a high of 34 percent in 1997 to 31 percent in 2009. The drop in private-sector unionization could be due to a number of factors, such as globalization leading to greater competition between unionized and non-unionized employees, industrial reorganization, a shift toward a knowledge and services-based economy in which collective bargaining is less prevalent, and changes in the laws that govern unions.

Previous analyses of the effect of union legislation on the private sector with respect to issues such as strike incidence, wage levels, strike duration, and investment (see, for example, Cramton, Gunderson, and Tracy 1999; Budd 2000) are based largely on data from the late 1960s to 1993. Likewise, most analyses of Canadian public-sector labour legislation (such as Currie and McConnell 1991, 1996; Gunderson, Hebdon, and Hyatt 1996) are based on data from the 1960s through only 1985.⁴ In the intervening years, however, the landscape for labour unions in Canada has changed considerably, with a far lower rate of private-sector unionization, a number of legislative changes, and a more globalized economy. Businesses, unions, and policymakers therefore need to understand how these laws affect labour relations today, rather than in an era when labour relations were markedly different.

3 Data from 1997 to 2008 are the share of workers covered by a collective bargaining agreement with a union, but are not necessarily union members. Thus, the decline in private-sector unionization after 1997 is even more significant than represented in the figure because union coverage is an upper-bound level of union representation.

4 Some more recent analyses of Canadian public-sector labour relations cover Ontario's legislative changes through 1993; see Hebdon and Mazerolle (2003) and Eaton (2007).

Figure 1: Union Coverage 1997-2009



Source: Statistics Canada, CANSIM database, table 282-0077.

Table 1: Public- and Private-Sector Union Coverage Rates, by Province, 2008

	Private Sector (% of employees)	Public Sector
British Columbia	18.2	75.4
Alberta	12.2	68.9
Saskatchewan	18.0	74.5
Manitoba	18.8	78.2
Ontario	15.4	70.9
Quebec	26.2	81.0
New Brunswick	13.0	71.1
Prince Edward Island	8.8	77.3
Nova Scotia	12.8	70.6
Newfoundland and Labrador	21.0	74.5

Source: Statistics Canada, CANSIM database, table 282-0077.

Strike Incidence and Length

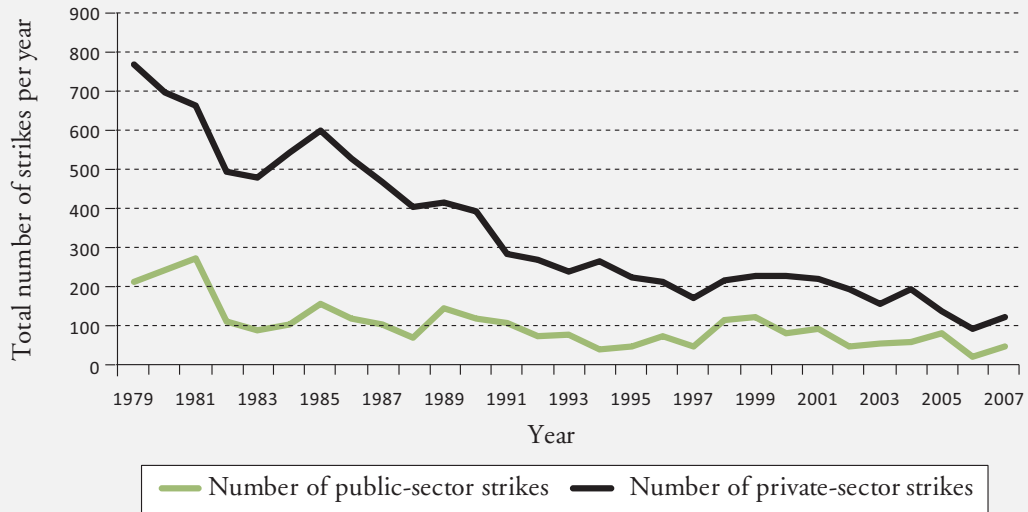
The average number of strikes per year in Canada has declined dramatically over the past 30 years (Figure 2). During the late 1970s and early 1980s, there were nearly a thousand strikes per year; in contrast, during the last half of this decade, there was an average of approximately 200 strikes per year. Yet, while strikes are becoming less frequent, they are now longer than in the late 1970s and early 1980s (Figure 3), especially in the public sector, where the average strike is now over two months long. Historically, private-sector strikes

have been longer than public sector ones, but today the average strike duration is the same in each sector.

Worker Days Lost

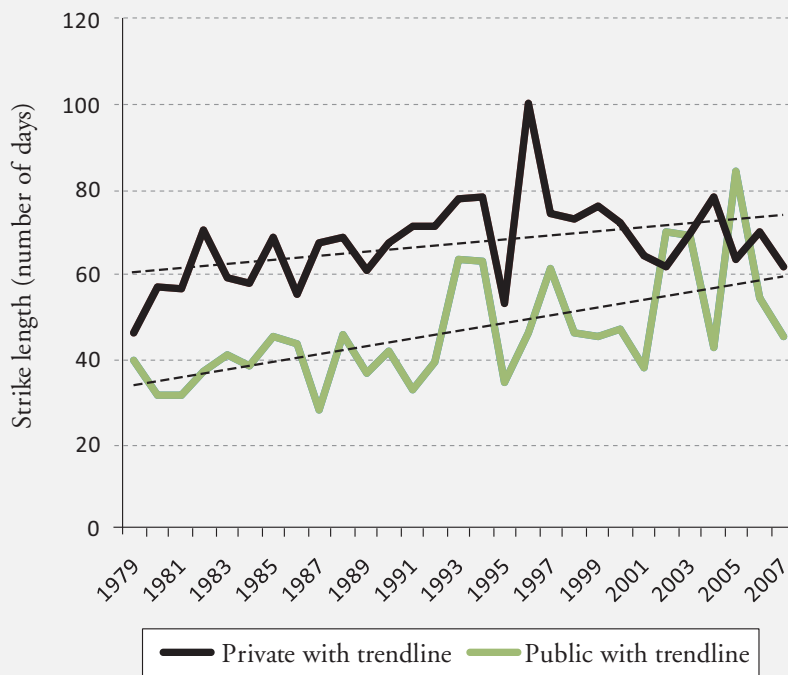
In Canada, the number of “worker days” lost to strikes – that is, the number of workers on strike or locked out multiplied by the length of the work stoppage – is higher than in most other countries. Looking only at strikes involving more than 1,000 workers, the United States lost an average of 34 worker days per 1,000

Figure 2: Number of Strikes Per Year, 1979-2007



Sources: HRDSC; authors' calculations.

Figure 3: Average Annual Strike Length



Source: HRDSC strike database for worker days lost. 2007 public sector employment CANSIM Table 183-0002, private sector employment CANSIM Table 281-0023. Comparable data for the number of workers under federal jurisdiction was not available.

Figure 4: Average Annual Worker-Days Lost Per Worker, 1993-2007



Sources: HRDSC; authors' calculations.

workers per year between 1997 and 2006 (Annis 2008), while Canada lost 242 worker days per year.⁵ Even so, this higher number is still substantially below that of the late 1970s and early 1980s.

The economic effect of lost worker days can be significant. Fewer days spent working reduces both workers' take-home pay and firms' profits. Firms might also reduce their planned capital investment in anticipation of lower capital investment use during strike periods. These two effects might reduce the productivity of both labour and capital, the two main components of economic productivity (see Baldwin and Gu 2008).

As Figure 4 shows, between 1979 and 2007, more worker days per worker were lost to work stoppages in the public sector (an average of 0.6) than in the private sector (an average of 0.1). Over the period 1993-2007, lost worker days were particularly high in the public sector in British Columbia, Quebec, and Newfoundland and Labrador, which averaged between 1.2 and 1.5 per worker per year.⁶ Except for New Brunswick, provinces with a high number of

worker days lost in the public sector generally also had a high number of days lost in the private sector. Prince Edward Island had the lowest number of worker days lost in the private sector (less than 0.05 days lost per year), while Newfoundland and Labrador had the highest rate (0.2 days lost per year).

In both the public and private sector, the average length of strikes increased between 1979 and 2007 even as the incidence of strikes declined (Figure 2). What might account for this phenomenon? One possible factor is the passing of labour legislation that makes it more difficult to strike while unintentionally encouraging its continuation. For example, an essential services designation that is meant to reduce the effect of a strike in the public sector might also reduce the incentive of employers and employees to settle. Strike behaviour might also be influenced by changes in wage levels, unemployment, or other local or national conditions. We attempt to control for these factors in our analysis in order to isolate the effect of labour legislation.

5 An exact comparison between the two countries is not possible because of differences in the methods they use to compile statistics on labour disputes. Since strikes in Canada involving more than 1,000 workers accounted for only about 60 percent of the average of 6.7 million worker days lost per year between 1997 and 2007, the actual average number of worker days lost per 1,000 workers over that period was 399, not 242.

6 The numbers shown in Figure 4 are for all workers, regardless of collective bargaining coverage; thus, the number of worker days lost per unionized employee would be higher.

Box 1: Categories of Collective Bargaining and Dispute Resolution Legislation

Public Sector

- **Compulsory arbitration:** Workers are not allowed to strike and unresolved disputes must be settled through final and binding arbitration. Types of arbitration include conventional arbitration (where the arbitrator fashions the terms of the contract) or final-offer selection (where the arbitrator selects the final offer of either the union or the employer).
- **Essential services designation:** Workers are allowed to strike but some portion of workers is legally obligated to continue providing designated services (as determined prior to a strike) during the job action. Procedures for the determination of essential services vary by province.
- **Right to strike:** Workers have the right to go on full strike.
- **Mandatory strike vote:** A majority of union members must vote in support of starting a strike, rather than the decision being left to the discretion of union leaders.
- **Reinstatement rights:** Workers are entitled to return to their positions after a strike.
- **Employer-initiated vote:** The employer may unilaterally (without requesting permission through the government or labour relations board) force a vote by employees on whether to accept the employer's final offer during negotiations.
- **Compulsory dues:** All employees in the bargaining unit must pay dues to the union regardless of whether they are members of the union.
- **Bans on temporary replacement workers:** Employers are prohibited from hiring short-term employees or using non-unionized employees during the course of a strike to replace striking workers temporarily.

General Labour Legislation

- **Conciliation:** Third-party intervention in negotiations from either a conciliation board or individual between the expiration of a contract and when a strike can legally begin.
- **Cooling-off period:** The number of days between the time the conciliation period ends and a strike legally can begin.
- **Secret ballot for union certification:** Employees seeking union certification must hold a secret ballot to determine if the majority of the voters support forming a union. Otherwise, unions may gain certification without a vote by presenting signed union cards that represent a majority of employees who support forming a union (percentages vary by province).

Source: Cramton, Gunderson, and Tracy. (1999); Currie and McConnell (1991).

The Effects of Labour Legislation in Canada

As a constitutional matter, provinces have jurisdiction over labour legislation for both public- and private-sector collective bargaining, exclusive of a distinct federal jurisdiction involving interprovincial industries.⁷ Both the provinces and Ottawa have made numerous changes to legislation on collective bargaining and dispute resolution over

the past 30 years – see Box 1 for a grouping of categories and brief descriptions of legislation.⁸

In our analysis, we distinguish between public-sector legislation and legislation that applies to all workers. Sector-specific legislation usually determines public-sector labour relations, such as provincial acts that apply only to police, fire fighters, healthcare workers, or provincial employees, while most private-sector employment falls under the relevant general provincial labour relations legislation.⁹ We do not include the

7 Industries under federal jurisdiction include shipping, airports and airlines, interprovincial and international transport, broadcasting and telecommunications, banks, First Nations governments, grain handling, uranium mining, and some other employers specifically declared by Parliament. Approximately 860,000 workers were under federal jurisdiction as of 2004 (Federal Jurisdiction Workplace Survey 2004). Of these workers, 52 percent were unionized. We identify contracts under federal jurisdiction in our database by their industry code.

8 We also consider contract reopeners in our empirical estimation as control variables, but do not report the estimated effects of these laws as they change too infrequently.

9 Public-sector workers are also subject to some provisions of provincial labour relations legislation when sector-specific legislation does not specifically exempt workers. Thus, in our analysis, we include the effects of specific provisions of general provincial labour codes on public employees when we believe that the legislation is applicable, but do not report the results, since public-sector wages are still determined only loosely by general legislation. An example of when this would not apply is legislation influencing the behaviour of strikes (such as reinstatement rights or temporary replacement worker bans) on workers who do not have the right to strike.

construction sector because it often falls under a unique section of provincial labour laws. In contrast, federally regulated industries fall under the Canadian Labour Code.

We expect very different effects in the public and private sectors from legislation. For example, secret ballot certification rules should have little effect on public-sector contracts compared to private contracts because a large share of the public sector is already unionized.

Public-Sector Legislation

Recent legislative changes to public-sector labour legislation include restrictions on the right to strike of “essential” public services in Saskatchewan in 2008 and the full removal of the right to strike for paramedics in Alberta (see Appendix Table A1). Nova Scotia also tabled legislation proposing that health care workers’ right to strike be removed, but a provincial election and change of government ended the proposal (Haiven and Haiven 2007). In early 2009, New Brunswick passed legislation restricting strikes in nursing homes,¹⁰ and both the cities of Ottawa and Toronto have considered requesting that higher levels of governments place restrictions on public transit workers’ right to strike (Dachis 2008) – indeed, a private member’s bill to that effect was being considered in the Ontario legislature at the time of writing.¹¹

PREDICTED EFFECTS: If governments forbid workers from going on strike and if a settlement cannot be freely reached between negotiating parties, legislation often requires the parties to settle disputes through a process of neutral, final, and binding arbitration. There are numerous reasons to think that compulsory arbitration might lead to higher wages. First, since neutrality requires that third-party arbitrators have no direct financial interest in the terms of their award, arbitrators might place little weight on employers’

concerns for wage restraint. Second, since arbitrators are often compelled to follow the precedence of previous agreements, there might be positive feedback between settlements and arbitrated awards. Thus, in an economic downturn, arbitrated settlements might be slow to reflect lowered wage and inflation expectations, in contrast to negotiated agreements, which are more likely to reflect changes in economic conditions. Alternatively, since arbitrators tend to follow settlements and other awards, it is an inherently conservative process. Thus, a competing hypothesis is that compulsory arbitration might reduce wage settlements. In this case, there might be negative feedback among arbitrated outcomes during an economic upturn if arbitrators follow awards from an earlier period of restraint.

Hebdon and Mazerolle (2003) found that mandatory arbitration led to an increase in employer-employee negotiation impasses as high as 20.7 percent of the time. They also found that while strike ban legislation is likely successful in reducing the likelihood of strikes it increases the likelihood of other types of disputes, such as work-to-rule or work slowdowns (see also Hebdon and Stern 2003).

The effect on wages of an essential services designation is difficult to predict. Such designations often end up in arbitration, suggesting that they might increase wages. On the other hand, union bargaining power might be diminished by the loss of the ability to withhold public services completely during a strike. We expect essential services designations to increase the frequency and length of strikes because the continuation of basic services makes work stoppages less politically costly to employers and less economically costly to unions. However, because the effectiveness of strikes is reduced as a bargaining tool, this would be a countervailing reason not to continue a strike or to strike in the first place. Table 2 presents a summary of the expected effects of public-sector labour legislation.

10 See “N.B. law to declare nursing home workers essential,” CBC News, March 31, 2009; available online at: <http://www.cbc.ca/canada/new-brunswick/story/2009/03/31/nb-nursing-home.html?ref=rss>.

11 Toronto’s public transit system falls under the jurisdiction of Ontario labour legislation whereas Ottawa’s public transit is regulated by federal legislation because OC Transpo operates across provincial boundaries. The provincial private member’s bill to restrict transit strikes in Ontario has been referred to the Standing Committee on General Government as of April 22, 2010.

Table 2: Expected Effect of Labour Legislation on the Public Sector

Type of Legislation	Effect on:		
	Wages	Strike Incidence	Strike Duration
Compulsory arbitration	uncertain	less	less
Essential services designation	uncertain	greater	greater

Source: Currie and McConnell (1991); Gunderson, Hebdon and Hyatt (1996).

General Labour Relations Legislation

Changes in recent years to provincial legislation that apply to both the public and private sectors include the introduction of employer-initiated final offer votes in Quebec in 2002 and a mandatory secret ballot for certification in Saskatchewan in 2008 (see Appendix Table A2). Alberta is also considering introducing compulsory union dues after a provincial court order. There have also been proposals in the House of Commons to ban temporary replacement workers for industries under federal jurisdiction. In the United States, where the measurable effect of secret ballots in Canada has significant relevance to US policymakers, Congress is debating an *Employee Free Choice Act* that would allow unions to seek workplace certification without a secret ballot.¹² In turn, changes in labour policy of such magnitude in the United States might renew interest in similar legislative reforms in Canada.

PREDICTED EFFECTS: We expect *mandatory conciliation* to reduce strike length and strike incidence by assisting both sides to reach an agreement. *Cooling-off periods* are expected to reduce the incidence of strikes by creating a period between the time mandatory third-party conciliation ends and strikes can legally begin. Parties might be able to reach an agreement during this time, reducing the number of strikes. A policy that reduces the threat of a strike also might reduce the bargaining power of unions and, thus, wages. However, longer delays

before a strike can begin might allow firms to stockpile output, thus allowing them to survive more frequent and longer strikes.

Mandatory strike votes require that a majority of voting union members support the strike in a secret ballot vote before it can legally commence. We expect this to have a minimal effect on all outcomes because most unions hold a vote before a strike starts, regardless of legislation. However, such legislation might have an impact in jurisdictions where union leadership is not responsive to members' wishes.

We expect *reinstatement rights* to increase strike incidence, strike length, and wages. Reinstatement rights increase the bargaining power of strikers by protecting the position they had before going on strike. Workers would have a greater incentive to hold out for higher wages and would be more likely to use the strike option if there were less chance of losing their jobs in response. On the other hand, legislation that is especially favourable to employees and increases strike incidence might reduce investment by firms in a jurisdiction with reinstatement rights, thus eventually reducing wages.

We expect *employer-initiated votes* on final offers to reduce strike incidence because employers likely would use this option if they thought there was a high likelihood that workers would accept the contract. This circumvention of union leadership might reduce the union's bargaining power, thus reducing wages. On the other hand, employers might appeal directly to workers with the offer of higher wages.

12 Also under consideration are possible reforms of the current secret ballot system, such as speeding up the voting process or fully removing the requirement to hold a secret ballot, but requiring that employees mail union memberships; see Kris Maher, "Specter suggests changes to union bill," *Wall Street Journal*, May 15, 2009; available online at: <http://online.wsj.com/article/SB124243752071226041.html>. Previous analysis of the expected effect of the proposed legislation (Layne-Farrar 2009) has methodological limitations that do not allow for an explicit analysis of secret ballots for union certification. See also Fortin (2009); Johnson (2009); and Sran and Stanford (2009).

Table 3: Expected Effect of Labour Legislation on the Private Sector

Type of Legislation	Effect on:		
	Wages	Strike Incidence	Strike Duration
Mandatory conciliation	none	less	less
Cooling-off period (per day)	less	none	none
Mandatory strike vote	none	none	none
Reinstatement rights	greater	greater	greater
Employer-initiated final offer vote option	none	less	none
Compulsory dues	greater	none	greater
Secret ballot for union certification	less	less	none
Ban on temporary replacement workers	greater	greater	greater

Sources: Adapted from Budd (1996); Cramton, Gunderson, and Tracy (1999); and Johnson (2009).

Compulsory dues checkoff might increase union strike funds, thus increasing the length of strikes, and result in employees seeking higher wages to offset the reduction in take-home pay diverted to union dues.

Secret ballots for union certification likely reduce strike incidence and wages. Requiring that employees hold a secret ballot to form a union would make it more difficult to form a union than is the case with “card check” certification, where a union can be certified with a majority of workers signing union cards. Secret ballots also reduce the success rate of union certification, by 9 percent according to Johnson (2002) and by 21 percent according to Slinn (2004). Riddell (2004) reports that the reduction in the union certification rate in recent years is entirely due to requirements for a secret ballot on certification, while Johnson (2004) suggests that the share of the workforce that is unionized would have fallen by about 15 percent had Canada imposed secret ballot requirements uniformly since 1980. We should note that our analysis does not capture other elements of the secret ballot process that vary from one province to another, such as the length of time between announcing and holding a vote and laws regarding intimidation of employees. Since secret ballot requirements lead to fewer certified unions, the result should be fewer strikes. Moreover, unions

that do form in jurisdictions with secret ballot laws face greater competition from non-unionized workers who, because they have less bargaining power, likely earn lower wages. This, in turn, should reduce the wages of unionized workers. We do not expect secret ballots for union certification to have any effect on the duration of strikes.¹³

A *ban on temporary replacement workers* is expected to increase the average length of strikes. Although originally framed as a means to reduce picket-line confrontations, temporary replacement worker bans might make an employer more likely to concede early to a strike (or the threat of a strike), knowing that recourse to other workers is not possible, thus reducing strike incidence and length. On the other hand, workers with greater bargaining power might see the strike as a more effective bargaining tool and want to use it both more often and for longer. The enhanced threat of strikes is expected to be significant enough to extract higher wages from employers, although the countervailing effect of lower firm investment in jurisdictions with temporary replacement worker bans eventually might reduce wages.¹⁴

Table 3 summarizes the expected effects of general labour relations legislation in the private sector.¹⁵

13 Evidence suggests that, unlike firms in the United States, firms in Canada often do not see a large decrease in market value once a union is certified (Martinello et al. 1995).

14 We do not consider the replacement workers ban that applies federally to be binding, as it is restricted to replacement workers that “undermine” unions – a definition that is rarely enforceable.

15 Our expectations of the effect of general labour legislation are based largely on Cramton, Gunderson, and Tracy (1999). Other interpretations exist, however, that might not be fully incorporated in this discussion. Given the competing theories, the effect of labour legislation is thus largely an empirical question.

Data and Methodology

Canada is an ideal country when it comes to studying the effects of union legislation: not only does it possess comprehensive data on strikes and union contracts, it also has different jurisdictions with different types of legislation that change over time.

Data

Human Resources and Skill Development Canada (HRSDC) collects and distributes a number of datasets on wages and strikes that we use in this *Commentary*, as follows:

- Public- and private-sector strikes: information on the name of the company affected and the narrow industry classification of the business, the union name, dates of strike start and end, how the strike was ended, the number of workers involved in the strike, and the city (or cities) and province the strike was in.
- The means by which a contract was settled: through a work stoppage, bargaining, arbitration, provincial legislation, mandatory conciliation, other possible outcomes, or a combination of these outcomes.
- Private- and public-sector wages: information on the name of the employer, the broad industry classification of the employer, the union name, the date the contract was settled, the effective date, the expiry date, and, importantly for our analysis, a unique identifier for each employer-union pair. Nominal wage information includes the previous wage level and the annual wage adjustments for the first three years as well as the average wage adjustment over the course of the contract.

The data we use provide information on bargaining that cover approximately 1 million

workers every year. See the Appendix for more detail on the data used in this analysis.

Methodology

The provinces provide a natural experiment to analyze the effect of labour legislation on outcomes such as wages, employment, the likelihood of strikes, investment, and other factors. When a single province changes its public- or private-sector labour legislation, we can see what happens in that sector and compare the effects to the situation in other provinces that did not institute a change.

In the public sector, provinces apply the same type of legislation to different types of employees, allowing us to generalize about the effect of the legislation without confusing the effect as being specific to a province or sector. To assess the effect of the legislation, we use regression analyses. Since provinces often make specific legislative changes at different times from other provinces, we can isolate the effect of the change in labour legislation by controlling for observable economic factors and unobservable characteristics of the union, employer, or the specific job. The other factors controlled for in each regression are reported in the relevant tables.¹⁶

When new legislation comes into force at the exact same time as other changes, the results should be interpreted with some caution.¹⁷ For example, Quebec introduced a number of legislative changes in 1978, Alberta made numerous changes in 1988, Ontario in 1995, and British Columbia in 1987. If multiple laws change at the same time, our empirical analysis cannot determine which law is responsible for the changes in wages or strikes. However, some types of legislation – specifically, secret ballot laws, reinstatement rights, and temporary replacement worker bans¹⁸ – are expected to have more

16 We apply fixed effects in the tests of public- and private-sector wages. We apply the fixed effects to union-employer pairs, which have a unique identifier that tracks negotiations over time, because we expect that characteristics inherent to such pairs will persist over time. We use fixed effects by province in one measure of strike incidence, but we do not have an identifier for union-employer pairs in the strikes dataset. We use other regression methodologies for other outcomes, depending on the type. See the Appendix for details. Regular ordinary least squares results are available from the authors. In most cases, OLS results for wages were not statistically significant for most labour legislation.

17 This affects only one out of every five observed changes to legislative rules, however, this overlap in the data does not affect the interprovincial components of the analysis.

18 These three specific laws were reformed at the same time in the same province in one out of every five cases of legislation change.

Table 4: The Effect of Public-Sector and General Legislation on Public-Sector Wage Levels, 1978-2008

Sector-Specific Legislation	Change in the Level of Real Wages (%)
Compulsory arbitration	1.2*
Essential service designation	-2.1**
Other controls	Real provincial wage (log), provincial unemployment rate, contract duration, bargaining unit size, year, previous contract bargaining outcome, previous wage level, existence of general labour legislation
Bargaining pair fixed effects	yes
Observations	7,104
R-squared	0.41

* Statistical significance level of 10%.

** Statistical significance level of 5%.

Sources: Authors' calculations from Statistics Canada and HRSDC. See appendix.

significant effects than other legislation introduced at the same time, such as mandatory strike votes.¹⁹

Public-Sector Legislation

We first analyze the effect of legislation regarding the right to strike of public-sector employees.

The Effect on Wages

The true test of the effect of compulsory arbitration on wage levels in the public sector would control for factors inherent to a specific bargaining group for reasons not observed in the data – for example, higher wages for specific services, cities, employers, or militant unions. We look at how wage levels change when a bargaining group changes from the right to strike (or another type of legislation) to compulsory arbitration or essential service designation (see Table 4).²⁰ We find that compulsory arbitration increases real

(constant dollar) wage levels by 1.2 percent, but only at the 10 percent level of statistical significance – that is, although banning strikes has a measurable effect on wages, it is weak in a statistical sense. We also find that an essential service designation has a negative effect on wage levels after controlling for the existence of other types of legislation.

The Effect on Strike Duration and Other Work Stoppages

The designation of a public service as essential reduces the political costs to governments and unions of not providing the service. We expect such reduced political pressure to resolve disputes to result in longer and more frequent strikes. An essential service designation increases the length of strikes by approximately 60 percent, although the result is only marginally significant and in some specifications not significant at all.²¹ No other legislation has a statistically significant effect on the length of public-sector strikes. Public-sector

19 Many labour legislation changes in Quebec were introduced by the Parti Québécois, hence some of the effect we find may be the effect of investor flight from Quebec in response to the sovereignty movement. As a test of this, we ran additional regressions excluding Quebec. Replacement worker bans lose statistical significance (which may be because this eliminates two-thirds of the observations affected by replacement worker bans), but reinstatement rights do not.

20 We include indicators of whether a bargaining unit is under a “duty-to-bargain” requirement or a “choice-of-procedure” requirement. Very few contracts are influenced by these provisions, however, and results are rarely significant, so we do not report them here.

21 Since there is not a sufficient number of strikes in sectors under compulsory arbitration to establish the effect on strike length, we do not report this result.

strikes occur in approximately 2.2 percent of the contracts in our dataset, and we find that an essential services designation does not significantly affect the likelihood of a strike.²²

Private-Sector Legislation

We now turn to the effect of provincial and federal labour codes on wages, strikes, and strike duration in the private sector.

The Effect on Wages

We assess the effects of different kinds of general labour legislation on private-sector real wages. (Table 5).

We find that reinstatement rights have a highly significant negative effect on wages: although the legislation guarantees that workers are able to return to their jobs, the consequence of this provision is to reduce wage levels by 5.3 percent, a result similar to that found in Budd (1996).

We investigated the effect of replacement worker bans over a period that includes a long time before and after such legislation was introduced in Ontario and British Columbia in 1993, and we find that such bans reduce wages by about 3.6 percent, contrary to both our expectations and the findings of previous literature. Earlier studies, covering the time between the introduction of bans in Quebec in 1978 and in British Columbia and Ontario in 1993, found that the effect – or merely the threat – of a ban increased wages (Cramton, Gunderson, and Tracy 1999; Gunderson 2008).²³ Thus, the long-term effect of temporary replacement worker bans might have set in only after 1993. The possible intuition behind these results is reduced investment – as Budd and Wang (2004) find –

because firms leave jurisdictions with legislation that makes them more likely to be affected by strikes with no recourse to alternatives. This, in turn, could put downward pressure on wages.²⁴ While replacement worker bans are popular with unions and might achieve the original goal of reducing picket-line violence (Savage and Butovsky 2009), which we do not measure, these results show that, in the long-term, the effect on wages is negative.

Requiring a secret ballot for union certification also has a significantly negative effect on wages for union members. Such a provision is expected to make it more difficult for employees to organize and to leverage collective bargaining to seek higher wages. We find that, over the past 30 years, wages have been approximately 1.7 percent lower when a secret ballot is required to form a union.²⁵ These results might underestimate the dampening effect of secret ballots on wages because the dataset includes only wage agreements for unions that have already formed. The effect seen here is thus likely the result of greater competition between unionized and non-unionized workplaces driving down wages. The effect of lower wages seen in workplaces that do not unionize might be even more significant.

We find that mandatory strike votes and laws allowing employers to force employees to vote on a final offer lead to higher wage levels, perhaps because employers subject to these laws offer higher wage packages to appeal directly to workers.

Finally, we find no statistically significant effect of requiring employees to pay union dues, falling just short of the 10 percent significance level.

22 This effect is statistically significant only at the 15 percent level of confidence, which is below a standard threshold that verifies the existence of an effect.

23 One possible explanation for this is that the introduction of the ban coincided with an increase in wages in Quebec that might be explained by factors other than replacement workers.

24 A Chow test of the on replacement workers before and after 1993 shows the coefficients are indeed different.

25 Analysis of the periods before and after 1993 shows that the effect has remained largely the same during periods of both growing and declining union coverage. However, the effect after 1993 is not statistically significant at the 10 percent level of confidence. The coefficient stays largely the same, suggesting the same effect, but with less accurate estimation.

Table 5: The Effect of Legislative Changes on Private-Sector Real Wages, 1978-2008

Type of Legislation	Change in the Level of Real Wages (%)
Mandatory conciliation	0.1
Cooling-off period (per day)	0.4***
Mandatory strike vote	2.8***
Reinstatement rights	-5.3***
Employer-initiated final offer vote option	1.8**
Compulsory dues	-1.7
Secret ballot for union certification	-1.7***
Ban on temporary replacement workers	-3.6***
Other controls	Bargaining pair fixed effects, real provincial wage (log), unemployment rate, year, contract duration, number of employees
Number of observations	4,260
R-squared	0.41

** Statistical significance level of 5%.
*** Statistical significance level of 1%.
Sources: Authors' calculations from Statistics Canada and HRSDC. See appendix.

The Effect on Strike Incidence

Although the number of strikes has declined, some policies – such as legislation that makes strikes less costly – might be counteracting this fall. Alternatively, laws such as secret ballot rules that make it more difficult for unions to form, reduce the number of workplaces able to legally strike thereby reinforcing the decline in strikes. As a test of the effect of labour legislation on strikes, we conducted an analysis of the number of strikes per month in a province and the number of strikes per firm (see Table 6).²⁶

We find that, on average, there were approximately 0.72 strikes per province per month, and that the number of strikes per month per province decreases with mandatory conciliation and the introduction of a secret ballot for union certification. These are the expected results, but the effect is weakly statistically significant. In contrast, banning temporary replacement workers increases strikes by 0.11 per

month per province, an increase in strike incidence of about 15 percent. As expected, the introduction of a secret ballot reduces the number of strikes in a province, by about 18 percent.

Mandatory strike votes have an effect on the number of strikes that is far larger than we expected. This is likely because all provinces now have had such legislation for at least the past decade, so that it is impossible to tell if the changes in strikes that occurred nationwide were actually caused by the legislation. Thus mandatory strikes votes likely do not have as large an effect on strikes as the above results suggest.

Our second test of the incidence of private-sector strikes looks at strikes per firm. Our results confirm those of Duffy and Johnson (2009) – namely, that bans on temporary replacement workers and reinstatement rights significantly increase the likelihood of strikes. Contrary to expectations, however, compulsory dues reduce strike incidence. With a provincial average of 0.028 strikes per thousand firms each month,²⁷

26 Specifically, we used a Poisson regression for strikes per month per province and an ordinary least squares regression for the number of strikes per province per month per million firms. The results are the same regardless of whether or not provincial fixed effects are included. See the Appendix for details.

As one reviewer suggested, we have also conducted this test using the number of strikes per number of bargained contracts (because of the falling unionization rates, there are relatively fewer employee groups that have the right to strike). The results do not change for major legislation (bans on replacement workers and reinstatement rights) and do not switch signs for other legislation.

27 For context, there were 144,500 firms in Alberta, 351,100 in Ontario, and approximately 1 million in Canada in 2003, the last year with firm counts.

Table 6: The Effect of Legislative Changes on the Likelihood of a Private-Sector Strike, 1978-2008

Type of Legislation	Change in the Number of Strikes per Month per Province	Change in the Number of Strikes per Thousand Firms per Month per Province
Baseline, at the mean of variables:	0.72	0.028
Mandatory conciliation	-0.14*	-0.012**
Mandatory strike vote	0.44***	0.0047
Reinstatement rights	-0.05	0.019***
Employer-initiated final offer vote	0.02	0.00150
Compulsory dues	0.04	-0.020**
Secret ballot for union certification	-0.13**	0.0015
Ban on temporary replacement workers	0.11**	0.0092***
Other controls	Provincial unemployment rate; provincial unemployment rate growth, year, season, number of employees (log); existence of first contract arbitration legislation and re-opener legislation, real provincial wage	
Number of observations	3,671	2,622
R-squared		0.41

* Statistical significance level of 10%. ** Statistical significance level of 5%. *** Statistical significance level of 1%.
Source: Authors' calculations.

the introduction of mandatory conciliation reduces this number by 0.012, a reduction of almost half. Bans on replacement workers increase the number of strikes each month for every million firms in a province by 0.0092, a one-third increase. Likewise, reinstatement rights significantly increase the likelihood of a strike by approximately two-thirds.

Considerable caution should be exercised in interpreting the results of legislation on strike incidence. Legislation is often introduced in areas with particularly high or low levels of strike incidence as a way to change the balance in bargaining, and is thus endogenous to the outcomes we are measuring. For example, provinces with already high strike levels – possibly those with high unionization rates due to either industrial make-up or other legislation – might introduce a ban on temporary replacement workers as a means to reduce strike levels, thus creating a spurious relationship between strike levels and legislation. Further research is needed to definitively identify the relationship between strike incidence and legislation.

The Effect on Strike Duration

We now turn to a test of how legislation affects the number of days a strike lasts. Over the entire 30-year study period, temporary replacement bans have increased average strike length by approximately 60 percent (Table 7). This result is similar to what previous studies have estimated prior to 1993 (see Cramton, Gunderson, and Tracy 1999) and to the finding of Duffy and Johnson (2009), although the latter analyze aggregate provincial monthly strike days whereas we use the length of each individual strike.

We find that mandatory conciliation increases the average strike length by more than 40 percent, suggesting it has the exact opposite effect on strike duration as intended. This might be the result of its having successfully reduced the incidence of strikes that would have been solved relatively quickly, leaving those that are more difficult to resolve to begin with. Hence, it might be incorrect to say that mandatory conciliation causes strikes to be longer, but rather that it changes the nature

Table 7: The Effect of Legislative Changes on the Length of Private-Sector Strikes, 1978-2008

Type of Legislation	Increased Length of Strikes (%)
Mandatory conciliation	41.2***
Cooling-off period (per day)	2.5*
Mandatory strike vote	-28.9***
Reinstatement rights	47.4***
Employer-initiated final offer vote	11.3
Compulsory dues	3.5
Secret ballot for union certification	17.1*
Ban on temporary replacement workers	58.6***
Other controls	Real provincial wage and unemployment rate; number of workers on strike (log); year, season, industry; length of previous strike (0 otherwise), province, union affiliation, contract re-openers, compulsory dues
Number of observations	9,688
R-squared	0.084

* Statistical significance level of 10%. *** Statistical significance level of 1%.
Sources: Authors' calculations from Statistics Canada and HRSDC. See appendix.

of strikes that do occur.²⁸ Each additional cooling-off day mandated by legislation also results in a slight increase (2.3 percent) in strike length.

Reinstatement rights increase strike length by nearly 50 percent. Again, the result that strikes are longer when the negative consequences of striking are less severe is not surprising. However, this is a different result than that found in Duffy and Johnson (2009), suggesting that reinstatement rights have different effects on the aggregate amount of days of strikes in a province than on the length of individual strikes. The average strike is about 60 days in length, but we find that replacement worker bans and reinstatement rights increase the length to about 90 days.

Mandatory strike vote rules reduce strike length by 28 percent. Requirements for secret ballots for union certification increase strike length by a relatively small 17 percent, a much smaller effect

than other types of legislation and is of weak statistical significance.

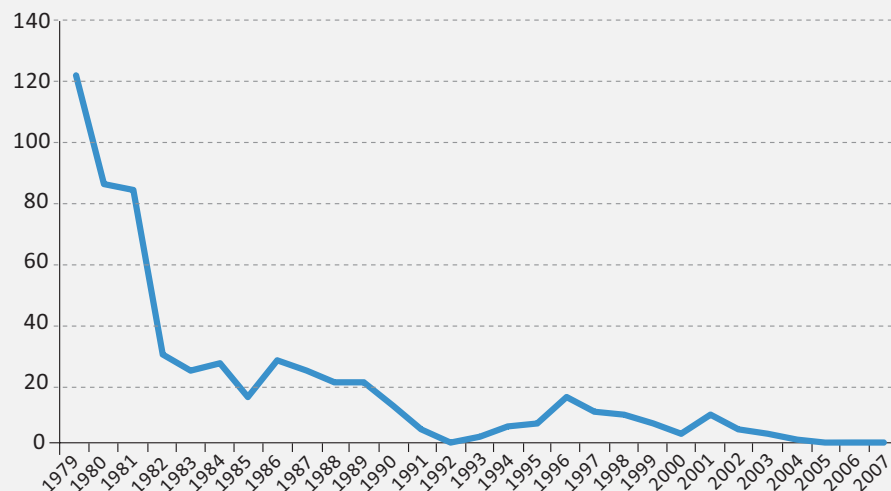
Other Effects

Labour legislation has other effects on the economy beyond those on wages or strikes. The longer-term effect of legislation can be reduced business investment as employers fear higher costs or more frequent and damaging strikes. As well, companies might hire fewer people in response to higher wage costs.²⁹ Recent evidence shows that bans on temporary replacement workers have reduced provincial investment by approximately 25 percent, with the effects especially pronounced in the first five years of the introduction of the policy (Budd and Wang 2004). Budd (2000) also shows that the employment rate declines by 1.28 percentage points after the introduction of a ban.

28 In the regression, we also include first-contract arbitration, contract re-openers, employer-mandated strike votes, and compulsory dues. The effects of most of these other types of legislation are statistically insignificant. We also included first-contract arbitration legislation, which had a statistically significant impact on strikes length. However, we can not assess the validity of this result since we do not know which strikes were subject to this policy because there is no identifier as to whether a contract is the first one negotiated. Results are available from the authors.

29 On the other hand, Martinello et al. (1995) find that increased unionization, as fostered by card-check legislation, has had little effect on firm profitability in Canada.

Figure 5: Number of Public-Sector Agreements Affected By Back-to-Work Orders



Source: HRSDC

Were a ban to be applied to Ontario, Budd estimates the employment rate would fall by 1.3 percentage points (from the February 2010 level of 61.1 percent to 59.8 percent), which, in a population of 10.8 million, would imply the loss of 137,000 jobs. Conversely, using the same data, we estimate that the removal of current temporary replacement worker bans would increase employment by 47,000 jobs in British Columbia and by 80,000 jobs in Quebec.³⁰

Back-to-Work Orders and Emergency Legislation

Provincial governments occasionally respond to strikes by public workers (and, in rare cases, private workers) with an order to return to work. These “back-to-work” orders may compel employees to accept the most recent offer from the employer or to seek compulsory arbitration. Provinces may also intervene before a strike happens, although we are unable to distinguish between a province’s intervening after a strike or before one has a chance to begin. We are also

unable to distinguish between different types of provincial orders, and so use the term generically.

Since 1978 there have been at least 88 instances in which a province or the federal government has legislated striking or locked-out workers back to work. A single back-to-work order (through legislation or other means) can affect a large number of contracts, as evidenced by the total of 712 agreements that have been affected by provincial orders since 1978. The number of agreements so affected, however, has fallen significantly since the late 1970s, as Figure 5 shows. Among recent examples of such orders are British Columbia’s intervening in strikes by teachers in 2005 and paramedics in November 2009, and Ontario’s ending of strikes by Toronto Transit Commission employees in April 2008 and York University staff in January 2009. Ontario often intervened to end strikes by teachers during the 1990s and early 2000s, while Quebec imposed terms in 2005 on a broad range of public-sector employees to avoid a strike. The federal government has also intervened in cases such as postal strikes, public-service strikes, and rail and port strikes under federal jurisdiction.³¹

30 Authors’ calculations from Statistics Canada’s Labour Force Survey, February 2010 (released March 12, 2010).

31 A full list of federal emergency legislation is available at: http://www.hrsdc.gc.ca/eng/labour/labour_law/ind_rel/09padhel.shtml and http://www.hrsdc.gc.ca/eng/lp/spila/cli/irlc/08federal_ad_hoc_emergency_legislation.shtml.

Table 8: The Effect of Provincial Back-to-Work Legislation on Real Wage Settlements and Real Wage Levels

	Percentage Point Change in Real Wage	Change to Real Wage Level
	(%)	
Legislated in current contract	-1.7***	-1.1***
Legislated in previous contract	0.7***	-2.9***
Other controls	Provincial unemployment rate, number of employees, contract duration, labour legislation	
Previous wage increase	yes	no
Previous wage level	no	yes
Real provincial wage levels	no	yes
Real provincial wage growth	yes	no
Bargaining pair fixed-effects	yes	yes
Number of observations	4,298	4,298

*** Statistical significance level of 1%.
Sources: Authors' calculations from Statistics Canada and HRSDC. See appendix.

Contracts settled with provincial orders have real wage settlements that are 1.7 percentage points below otherwise similar contracts (Table 8). This is not surprising, since workers who go on long or contentious strikes that end by provincial decree likely walk out in response to contracts with very poor terms. It thus might be that low wage offers increase the likelihood of back-to-work legislation. However, the effect on the subsequent contract after a union is legislated back to work is that wage agreements are higher than otherwise similar contracts, by about 0.7 percentage points, only partly compensating workers for the reduced wages of the prior contract.

The net effect: real wage levels compared to otherwise similar contracts are lower after back-to-work legislation. Wage levels eventually decrease to 2.9 percent below otherwise similar contracts by the time of the next contract, making the total reduction in take-home pay significant.

A back-to-work order also changes the likely outcome of the next round of bargaining. We examined how a contract is settled in the current contract dependent on how it was settled in the previous contract (the most common outcomes are legislated back to work, freely negotiated without a work stoppage, or settled through arbitration) (Table 9). The table reports log-odds ratios: a ratio over 1 indicates an increase in

likelihood, a ratio below 1 indicates a reduction in likelihood.³² For example, a ratio of 3.41 suggests the likelihood of a back-to-work order to settle the next contract is 3.41 times higher if the current contract is settled by a back-to-work order. If the previous contract was settled by a work stoppage, the next contract agreement is about half as likely to be freely negotiated (row 1, column 1). Arbitration in the previous contract reduces the likelihood of a freely negotiated next contract, but increases the likelihood that the province will intervene or use arbitration in the next contract. Likewise, a previous back-to-work order more than triples the chance of arbitration or a back-to-work order and reduces by two-thirds the chances of a freely negotiated settlement in the next round of negotiations.

These results suggest that back-to-work legislation negatively affects the ability of labour and management to take responsibility for fashioning their own solutions to problems by increasing their reliance on third parties and postponing negotiations to the next round. If the two sides of the agreement know the province will make the hard decisions for them, they have no reason to do so themselves. Back-to-work legislation may be appealing as a way to resume public services, but its long-term consequences could be negative.

³² We use a logit regression; see the Appendix for details.

Table 9: Change in Odds of Current Contract Outcome Based on Previous Contract Outcome, public sector

Previous Contract Outcome	Outcome of Current Contract		
	Freely Bargained	Arbitration	Provincial Order
	<i>(log-odds ratio)</i>		
Work stoppage	0.48***	1.89**	1.41
Arbitration	0.62***	2.36***	0.68
Provincial order	0.33***	3.10 ***	3.41 ***
Other controls	Labour legislation, year, season, region, industry, real provincial wage growth, provincial unemployment rate, real average wage increase in previous contract, previous contract duration (log days)		
Number of observations	7,087	7,052	4,822

** Statistical significance level of 5%. *** Statistical significance level of 1%.
 Note: A ratio over 1 indicates an increase in likelihood, a ratio below 1 indicates a reduction in likelihood.
 Sources: Authors' calculations from Statistics Canada and HRSDC. See appendix.

Conclusions and Policy Recommendations

The findings we present in this *Commentary* have implications for labour relations in both the public and private sectors that the federal and all provincial governments should heed.

Public-Sector Labour Relations

Governments can reduce their labour costs by reducing their reliance on compulsory arbitration. Although strikes by employees providing some services currently subject to compulsory arbitration might be politically costly, the long-term effects of higher costs paid by taxpayers might offset any temporary loss of services. Governments concerned with the increasing length of strikes should also reconsider the recent trend toward the designation of “essential services,” which we find reduces the incentive for both sides to reach an agreement and likely prolongs strikes. However, the wage costs of the designation model are smaller than compulsory arbitration.

Emergency legislation has significant side-effects that should be considered before such legislation is passed. Freely negotiated settlements are less likely in the future after the introduction of back-to-work legislation. Unions that are ordered back have less bargaining power after the first introduction of “back-to-work” legislation, which reduces wages and wage adjustments in the future.

Policy thus should aim to facilitate free bargaining between parties and rely minimally on government intervention.

Private-Sector Labour Relations

Bans on temporary replacement workers were designed to reduce picket line violence. In this respect there is only anecdotal evidence that they may have been successful. We found, however, that these bans have significant negative consequences. Although wages do increase at first, the longer-term effect is to reduce wages, perhaps as a result of long-term decreases in employment or investment because of the negative long-term effect of such bans on the economy. Bans also increase both the length and likelihood of strikes.

Only British Columbia and Quebec currently have bans on temporary replacement workers. Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Prince Edward Island, and the federal government all have reinstatement rights legislation in effect and should take into account lower wages and longer strikes in any cost-benefit analysis of this policy.

Governments considering introducing or removing the requirement to have a secret ballot on union certification should also heed the significant and measurable effect of this provision on wages. Unions have fought to remove secret ballots for certification votes to ease union formation, and while the higher wages for workers

that result from greater unionization due to easier union certification might be an attractive prospect for some policymakers and politicians, they come at a cost to firms and lead to more strikes, as shown in Manitoba, Quebec, Prince Edward Island, and New Brunswick, which do not require a secret ballot.

Governments also might want to reconsider their approach to mandatory conciliation and rules regarding strike votes and compulsory dues. As a result of these provisions, the number of strikes has fallen substantially over the past few years, but the average length of strikes has commensurately increased. Likewise, mandatory

periods before strikes begin might have the unintended consequence of making strikes longer.

What is true of all the types of labour legislation we discuss in this *Commentary* is that they often have unintended consequences. Whether the legislation is to end strikes, prevent strikes by public-sector workers, or change the balance of union-employer bargaining power, there is a possibility of an effect on wages or labour disruptions. It is up to policymakers to determine whether the unintended and long-term consequences of the legislation they propose are worth the benefits they seek.

This appendix provides further detail on the data and methodologies used in the paper. All operations were performed in the STATA statistical package, version 10.

Control Data

The contract-level data discussed above are merged to a number of data sources by province and month. Real provincial wage levels are computed using 2002 real wage levels.³³ CANSIM Table 281-0022 gives hourly wages by province from 1961 to March 1983. The hourly wage data are extended to later years using the index of wages by month and province from CANSIM Table 281-0009. The wage levels for PEI from 1983 on are from CANSIM Table 281-0004 and pre-1983 wage levels are missing and calculated using the average of other Maritime Provinces. We use the natural logarithm of provincial wages in our regressions. Provincial CPI uses CANSIM table 326-0020, where 2002 is the base year. We calculate monthly unemployment by province from CANSIM table 282-0001.

Contract Data

Human Resources and Skill Development Canada (HRSDC) collects and distributes a number of datasets on wages and strikes used in this paper.

There were approximately 5,300 private-sector contracts negotiated between January 1978 – the first month of the dataset – and April 2008, which is the last month that wage and strike data could be matched to other supporting economic data. The wages dataset

only provides wage information for bargaining units that contain at least 500 workers. If bargaining units over 500 employees are structurally different from bargaining units smaller than 500 employees, the results from this analysis may not be applicable to smaller firms.³⁴

Campoletti, Hebdon, and Hyatt (2005) show that strikes are rarer, although longer, for employers with fewer than 500 workers. We are thus looking at the sub-sample of bargaining units most likely affected by strikes and where strikes are more likely to be economically significant because of their size. Larger firms are also more likely to be national firms, with more choice as to location of production and are likely more sensitive to provincial labour legislation than smaller firms. The strikes dataset contains information on approximately 10,000 strikes where at least 4 worker-days were lost, thus containing both large and small firms.

We have information on the means by which a collective agreement was settled for 8,366 private and 8,380 public agreements. Outcomes are available for nearly all agreements over 500 workers and 2,479 public and private agreements with less than 500 employees. We merge outcomes with wage agreement information in agreements with more than 500 workers.

The contract-level data provide wage-level and annual negotiated settlement data. We calculate the real hourly wage in the contract by applying the average annual increase of a contract to the previous wage level as reported in our dataset. We then take the real hourly wage in 2002 terms using the CPI at the time the contract is negotiated. We use the natural log of the real hourly wage in all regressions. Our wage database does not provide comparable union/non-union wage levels.

³³ We use CANSIM Table 326-0020, Consumer price index (CPI), with 2005 goods weighting with 2002 as the base year.

³⁴ Further, as a reviewer pointed out, there may be a selection bias if some types of legislation have the effect of reducing the number of employees, thus making firms in jurisdictions with this legislation less likely to report wages. The cutoff of 500 employees is an economically arbitrary cutoff. We have conducted a Heckman selection test on the linear regression of private-sector real wages and real wage growth. The result of the selectivity test was found to be zero, indicating that self-selection can be ignored.

Each collective agreement in the public-sector wages and strikes dataset is assigned a service sector, as shown along the left-hand side of Table A1, based on the broad industry category reported by HRSDC. Specific keywords in the employee description are used to assign workers to narrower categories within the broad sector definitions.

However, we cannot distinguish between different types of arbitration. Conventional interest arbitration allows arbitrators to fashion awards, while final offer arbitration forces the arbitrator to choose the final offer of either the union or the employer. We only examine the effect of arbitration in general. We also have no measure of the percentage of workers covered by essential services designation. The percentage of workers covered by essential services designation may have an effect on wages or strikes.

A further caveat is that the labour cost we have reflects only wage adjustments and wage levels. We do not have information on benefit levels or pensions. However, we find in our dataset that wage agreements are generally five times more likely than benefits to be the reported issue of contention in negotiations. HRSDC reports that wage levels or adjustments are the causes of more than 50 percent of strikes with reported issues, while benefits are the next most common dispute, representing 13 to 15 percent of disputes.

Information on changes in legislation comes from various sources from the Labour Law Analysis unit at HRSDC. We rely on previously existing literature on the dates that compulsory arbitration, choice of procedure and the right to strike was extended to specific sectors as well as for general labour legislation.³⁵ We then identified when specific sectors are assigned an essential services designation.³⁶ We assume that

legislation only influences agreements if it is in effect on the day the agreement is settled.³⁷ Another concern is that the impact of legislation also depends on how it is administered not just the letter of the law.

Statistical Analysis

We use regressions, as is common in many empirical analyses. The exact methodology we use differs based on the outcome being measured. All regressions use a 'dummy variable' equal to 1 when legislation applies to a contract or province.

Wages

The real hourly wages test uses a fixed-effects regression. This controls for effects that are specific to a bargaining pair. This method also controls for effects, such as the province or the sector, that do not change over time. The dependent variable is the log of real hourly wages. The interpretation of the dummies for the existence of legislation is that when the legislation is in effect the reported coefficient represents the percentage change in real wage levels. Standard errors are clustered at the bargaining pair level to correct for error structures inherent to the bargaining pair. Weights for provincial population or the number of contracts settled in a province are not used.

Strike Duration

This analysis uses the log of the number of days that a strike lasts as the dependent variable. The indicator and calculation of whether a strike occurred previously is determined by identifying strikes in the same union, employer and city. Ordinary least squares (OLS) regression is used

35 Given the difficulty in assessing the exact date when legislation takes effect and the true nature of legislation (as shown in Currie and McConnell (1991), Gunderson, Hebdon and Hyatt (1996) and Currie and McConnell (1996), for example) we rely on third-party definitions of legislation to the greatest extent possible.

36 This is based on our interpretation of labour legislation created by HRSDC Labour Law Analysis through the annual "Highlights of Major Developments in Labour Legislation" going back to 1980 and Adell et al. (2001).

37 See Appendix tables A1 and A2. The tables report only the year when legislation comes into force, however we use the exact date that legislation came into force in our analysis.

in the regressions, as there is no consistent bargaining pair identifier in the dataset nor are there many repeat strikes in a bargaining pair that would distinguish fixed effects from OLS.

Strike Incidence

This section uses two regressions techniques applied to two measures of strike incidence. First, the number of strikes per month per province is calculated by summing the number of strikes in a province per month. This is again merged to provincial wage and unemployment data that controls for economic factors. Fixed effects are applied at the provincial level. A Poisson count regression controls for the fact that many provinces will have no strikes in a month.

We also use an OLS regression for the count of the number of strikes per thousand firms per month, using firm level counts per province provided by Susan Johnson (see Duffy and Johnson 2009 for details on this data). However, firm counts are not available for the federal jurisdiction, PEI, or for years after 2003, resulting

in a lower number of observations in this analysis compared to other methods used in the paper.

Industry level controls are not available for either regression; hence this analysis cannot be conducted for public-sector strikes that depend on sector identification.

Back-to-work Likelihood

We use a logit model to calculate a change in the odds of a contract outcome based on previous contract outcomes. A logit model is used when the dependent variable is an indicator of which of two outcomes. Table 9 reports three logit regressions, with the outcomes being whether (or not) there is a provincial order, arbitration, or a freely bargained outcome. This uses public-sector wage level and agreement contract data merged to HRSDC indicators of contract outcomes (freely bargained, arbitrated, reached after a work stoppage, reached in mediation, or settled by provincial order are the most common outcomes). We use a dummy variable of 1 to indicate which outcome applies.

Appendix

Table A1: Public-Sector Collective Bargaining Rules and Year of Change, by Province and Sector since 1978

Occupation	Newfoundland and Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Federal
Firefighters	arbitration	arbitration	strike: before 2006 ^a arbitration: since 2006	arbitration	arbitration	arbitration	arbitration	strike: before 2008 essential: since 2008	arbitration	choice: before 1987 essential: since 1987	essential: since 1982
City police	strike	arbitration	strike: before 2005 ^a arbitration: since 2005	essential: before 1989 arbitration: since 1989	arbitration	arbitration	strike: before 1982 arbitration: since 1982	strike: before 2008 essential: since 2008	arbitration	choice: before 1987 essential: since 1987	n/a
Corrections	strike	strike	strike	strike	arbitration	arbitration: before 1994 essential: since 1994	strike: before 2000 essential: 1996-2000, arbitration: since 2000	strike: before 2008 essential: since 2008	arbitration	essential	essential: since 1982
Provincial police	arbitration	n/a	n/a	n/a	arbitration	arbitration	n/a	n/a	n/a	n/a	n/a
Municipal employees	strike	strike	strike	strike	strike	strike	strike	strike: before 2008 essential: since 2008	strike	strike	n/a
Provincial employees	strike: ^a since 1982	arbitration	arbitration	strike	strike: before 1982 essential: since 1982	arbitration: before 1994 essential: since 1994	strike: before 1996 essential: since 1996	strike: before 2008 essential: since 2008	arbitration	essential: before 1993 strikes: since 1993	essential: since 1982
Nurses in hospitals	strike	arbitration	strike	strike	strike: before 1985 essential: since 1985	arbitration	strike	strike: before 2008 essential: since 2008	strike: before 1983 arbitration: since 1983	choice: before 1987 essential: since 1987	essential: since 1982
Nurses not in hospitals	strike	strike	strike	strike	strike: before 1985 essential since 1985	arbitration	strike	strike	strike: before arbitration: since 2003	choice: before 1987 essential: since 1987	choice
Nursing homes	strike	arbitration	strike	strike: before 2009 arbitration: since 2009	arbitration	arbitration	strike	strike	strike	choice: before 1987 essential: since 1987	n/a
Other hospital worker	strike	arbitration	strike	strike	strike: before 1985 essential: since 1985	arbitration	strike	strike: before 2008 essential: since 2008	arbitration	choice: before 1987 essential: since 1987	essential: since 1982
Paramedic	strike	strike	strike	strike	strike: before 1985 essential: since 1985	strike: before 2000 essential: since 2000	strike: before 2002 arbitration: since 2002	strike	strike: before 2008 arbitration: since 2008	essential	n/a
School teacher	strike	arbitration	strike	strike	strike	strike	arbitration	choice	strike	arbitration: before 1988 strike: 1988-2001 essential: since 2001	choice
Other school employee	strike	arbitration	strike	strike	strike	strike	arbitration	strike: before 2008 essential: since 2008	strike	strike	n/a
University/college teacher	strike	strike	strike	strike	strike	strike	strike	strike: before 2008 essential: since 2008	strike	strike	n/a
University/college staff	strike	strike	strike	strike	strike	strike	strike	strike: before 2008 essential: since 2008	strike	strike	n/a
Transit	strike	strike	strike	strike	strike: before 1982 essential: ^b since 1982	strike	strike	strike	strike	strike	n/a
Utilities	strike: before 1996 essential: since 1996	strike	strike	strike	strike	strike	strike	strike: before 2008 essential: since 2008	strike	strike	n/a

Note: For analysis, the exact date when the legislation comes into affect is used; changes imposed prior to 1978 are not reported.

^a Provincial employees in Newfoundland and Labrador had a “duty to bargain” treatment until 1983.

^b Transit workers in Montreal must provide rush-hour services.

Sources : Authors’ interpretation of Human Resources and Skills Development Canada, Highlights of Major Developments in Labour Legislation (Ottawa, various years), data provided by Human Resources and Skills Development Canada, Labour Law Analysis unit; Adell, Grant, and Ponak (2001).

Appendix

Table A2: Private-Sector Collective Bargaining Rules and Year of Change, by Province and Sector since 1978

Policy	Newfoundland and Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Federal
Mandatory conciliation board or officer	yes ^a	yes	yes	yes	no	yes: before 1986 no: since 1986	no	no	yes: before 1981 no: 1981-88 yes: since 1988	no	yes
Cooling-off days	7	14	14	7	2	14	7	0: before 1983 2: since 1983	14: before 1981 3: 1981-88 14: since 1988	3	7: before 1998 21: since 1998
Mandatory-strike vote	yes: since 1994	yes	yes	yes	yes: since 1978	yes: since 1995	yes: since 1985	yes	yes	yes	yes: since 1999
Employer-initiated final offer vote option	no	no	no	yes: since 1994	yes: since 2002	yes: since 1980	no	yes: since 1983	yes: since 1988	yes: since 1987	no
Reinstatement rights	no	yes: since 1987	no	no	yes: since 1978	yes: before 1992 no: 1993-95 yes: since 1995	yes: since 1985	yes: since 1994	yes: since 1988	no	yes: since 1999
Compulsory dues	yes: since 1985	no	no	no	yes: since 1978	yes: since 1980	yes	yes	no	yes	yes: since 1984
Bans on temporary replacement workers	no	no	no	no	yes: since 1978	yes: 1993-95 no: since 1995	no	no	no	yes: since 1993 limited: ^b since 1998	
Secret ballot for union certification	yes: since 1994	no	yes	no	no	yes: since 1995	yes: 1997-2000 no: since 2000	yes: since 2008	yes: since 1988	yes: 1987-1993 no: 1993-2001 yes: since 2001	no

Note: For the analysis, the exact date when the legislation comes into affect is used.

^a Newfoundland and Labrador is the only province that uses a mandatory conciliation board for third-party conciliation. We do not attempt to distinguish the effect of a mandatory conciliation board versus that of a conciliation officer.

^b We do not consider the temporary replacement workers ban that applies federally to be binding because it is restricted to replacement workers who “undermine” unions, a clause that is not practical to enforce.

Sources: Authors’ interpretation of Human Resources and Skills Development Canada, Highlights of Major Developments in Labour Legislation (Ottawa, various years); data provided by Human Resources and Skills Development Canada, Labour Law Analysis unit; Johnson (2009).

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