

ALTERNATIVE APPROACHES TO FUNDING WORKERS' COMPENSATION

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Alternative Funding Mechanisms for Workers' Compensation: An International Comparison

Abstract

Countries vary greatly with respect to how they fund workers' compensation systems in terms of the sources of funds, the mechanisms used, and the allocation of system costs among employers and others. These different funding approaches can have significant implications for system performance, including employers' incentives to promote workplace safety. Government officials and other stakeholders have a strong interest in systems in other jurisdictions as they consider improvements to their own schemes. This paper examines the major alternative approaches to funding compensation for work-related injuries and illnesses, their rationales, and their administrative and behavioral consequences. We discuss the relative advantages and disadvantages of different systems and the trends toward more refined, actuarially-based approaches intended to promote greater equity and efficiency.

Introduction

Compensation for injury or disease arising out of employment is guaranteed by some form of government-mandated insurance (at least nominally) in virtually all nations, even the least-developed economies.¹ There is wide variation among countries with respect to how they fund injuries related to employment (hereafter called "workers' compensation" systems) in terms of the sources of funds, the mechanisms used, and the allocation of system costs among employers and others.

A number of factors appear to contribute to the variation, including the characteristics of a nation's economy, prevailing ideologies and philosophies, and cultural values. It is interesting to consider how important values or objectives are prioritized in the design of these systems, such as:

- equity of funding burdens across employers;
- adequacy and equity of benefits and adequacy of compensation for injured workers;
- rehabilitation and return to work
- actuarially correct charges for insurance coverage;
- intergenerational equity in funding system costs; and
- workplace safety.

A country's administrative capabilities and resources necessarily constrains the sophistication and complexity of the kind of funding system that it can support. While not all countries are in a position to establish or maintain sophisticated, actuarially-based systems for workers' compensation funding, the issues associated with structuring such systems are important to examine because of their policy implications. Indeed, as less-

¹ The US Social Security Administration has compiled a description of social insurance mechanisms in 112 countries. These descriptions are contained in a series of publications entitled *Social Security Programs Throughout the World*. Separate reports are published for four different regions of the world: Africa, the Americas, Asia and the Pacific, and Europe. Each of the most recent reports was reviewed for this paper and are listed separately in the References section of the paper.

developed countries expand their economies, some consider refinements of their workers' compensation systems, including funding mechanisms that incorporate more actuarial elements. This is an exercise that necessarily confronts the policy issues associated with these elements. Consequently, we discuss the most significant of these elements and issues for systems and jurisdictions where they are relevant. Government officials and other stakeholders have a strong interest in looking at systems in other jurisdictions as they consider improvements to their own schemes.

This paper first describes the major alternative approaches to funding compensation for work-related injuries and illnesses. We explore the rationale for each approach along with their administrative and behavioral consequences. We then focus on the details of some prototypical funding mechanisms and consider their relative advantages and disadvantages. Given the variation in systems, we discuss only the most important features and illustrate the differences with a limited set of examples. This is followed by a review of how workers' compensation funding mechanisms and other government financial incentives have been used to promote workplace safety. Finally, we review the most notable changes in workers' compensation funding mechanisms to discern certain trends toward a predominant model.

Overall Funding Approaches

With few exceptions, three groups are required to fund social insurance programs: taxpayers, employers, and insured persons. In most countries, employers are targeted for paying all or most of the costs of workers' compensation. Insured workers are seldom charged explicitly for benefit payments.²

Except in cases of "pure social insurance" systems noted below, governments usually try to separate workers' compensation from their general budget and revenue systems. Instead, they establish earmarked accounts for different social insurance programs with the goal of having employers fund these segregated programs. In practice, however, general tax revenues or other social insurance programs are sometimes tapped to bail out insolvent workers' compensation systems or pay for special benefits to injured workers.

In Table 1, we summarize the funding mechanisms in the 20 most populous countries, ranked in descending order of their gross national income per capita (which serves as rough measure of the level of economic development). With respect to the "types of systems," we distinguish three primary categories: social insurance; private and/or public insurance; and employer liability. With respect to how employers are required to fund workers' compensation costs, we distinguish four principal categories: fixed flat rates (tied to payroll), contribution rates that vary among employers according to some system for assessing their relative risk, insurance premiums paid to private and/or public insurers, and direct reimbursement of their workers' compensation costs.³

² Although our focus is on how various systems nominally structure premiums and assessments, it should be noted that some economists argue that the burden, or "incidence of workers' compensation premiums is shared with workers in the form of lower wages or other forms of compensation. There is fairly strong empirical evidence that supports the hypothesis that the majority of insurance costs are born ultimately by workers in the form of lower wages (Viscusi and Moore, 1987).

³ This categorical scheme and the workers' compensation information provided in Table 1 are drawn from the reports published by the US Social Security Administration.

Table 1
Workers' Compensation Funding Mechanisms
20 Most Populated Countries in 2004

Country	Population (000)	Gross National Income Per Capita in 2003 (\$US)	Work Injury	
			Type of System	Employer Funding
United States	293,028	37,870	Private or Public Insurance	Insurance premiums or self-insurance
Japan	127,333	34,180	Social Insurance	% of payroll according to historical accident rate
Germany	82,425	25,270	Social Insurance	% of payroll according to assessed risk
France	60,424	24,730	Social Insurance	% of payroll according to assessed risk
Mexico	104,960	6,230	Social Insurance	% of payroll according to assessed risk
Turkey	68,894	2,800	Social Insurance	% of payroll according to assessed risk
Brazil	184,101	2,720	Social Insurance	% of payroll according to assessed risk
Russia	143,974	2,610	Social Insurance	% of payroll according to assessed risk
Thailand	63,731	2,190	Employer Liability, Compulsory insurance with public insurer	% of payroll according to historical accident rate
Iran	67,503	2,010	Social Insurance	Fixed % of payroll
Egypt	76,117	1,390	Social Insurance	Fixed % of payroll
China	1,298,848	1,100	Social Insurance, Employer Liability	% of payroll according to assessed risk
Philippines	86,242	1,080	Social Insurance	Fixed % of payroll
Indonesia	238,453	810	Social Insurance	% of payroll according to assessed risk
India	1,065,071	540	Social Insurance	Fixed % of payroll
Pakistan	159,196	520	Social Insurance	Total cost
Vietnam	82,663	480	Social Insurance	Fixed % of payroll
Bangladesh	141,340	400	Employer Liability	Total cost
Nigeria	125,744	350	Employer Liability, insurance with private insurer	Total cost through direct provision of benefits or insurance premium
Ethiopia	71,337	90	Social Insurance	Fixed % of payroll

Source: US Bureau of Labor Statistics, US Social Security Administration

In reviewing Table 1, there is a definite pattern that suggests a relationship between the level of economic development and how employers' funding contributions are determined – more developed countries tend to employ more refined or risk-based funding allocation methods. However, with respect to the choice of the institutional vehicle (e.g., private insurance, social insurance, employer liability, etc.) no clear pattern is evident from this table. These observations tend to be consistent with our broader examination of countries' different systems for workers' compensation. Some highly developed countries employ public or social insurance mechanisms, while others rely more on the private sector to perform many system functions. To put it another way, either public or private entities can administer fairly refined and risk-oriented contribution or funding mechanisms. The choice of public or private delivery mechanisms appears to be more a matter of preference, rather than something that is associated with the level of economic development. We should note that in our discussion of different systems we use the term “pure social insurance” as one of several approaches to how occupational injury/disability benefits are funded and whether occupational injury/disability is separate from other elements of social insurance benefits. In Table 1, which is based on SSA descriptions, “type of system” refers primarily to the delivery mechanism.

Pure Social Insurance Systems

The different types of systems are depicted schematically in Figure 1. The “pure social insurance” approach to workers' compensation views social insurance as a fundamental right or entitlement of citizenship. Benefits are distributed without regard to personal contributions to funding the program, economic circumstances (e.g., employment history or earnings), or personal fault or responsibility for disability. To the extent this entitlement philosophy animates the national social insurance system there is no need for a distinct system of compensation for workers. At the extreme: 1) there is no distinction in benefit levels between disability or medical treatment by causation (work related or not) or circumstance (commuting to work or vacation travel); and 2) the funding for this broad social protection comes from the national treasury.

In these systems, occupational injury benefits tend to be funded and administered by the same government agency that runs the public retirement pension and non-occupational disability system. Medical care is often socially provided and it is the same for occupational and non-occupational injuries and diseases.

Distinction for Occupational Insurance

A second type of system recognizes a distinction between injury and disease arising out of employment versus other causes. A separate set of benefits and funding sources is created for work-related injuries. The funding source is almost exclusively employers. Within this system there are two subcategories: 1) funding based on a single flat payroll tax for all employers; and 2) a payroll tax with some discrimination across classes of employers on the basis of injury rates or riskiness of the industry. Discrimination in class rates is only weakly associated with the inherent risks or claims of an employer's operations.

At the same time, these systems may have safety funds and incentives that are broadly available to induce or assist most employers in promoting safe workplaces. They may hold individual employers accountable with sanctions for violating safety rules but not for individual loss experience. This is probably the most common model. Countries as large as Russia and India follow this approach. New Zealand and provinces within Canada also could be placed in this category. While this type of system is still relatively simple to administer, the distinction of occupational injury costs ties funding more closely to the risk of claims for a group of like employers than the pure social insurance model.

Within either of the above two models there are two further divisions: 1) pay-as-you-go systems (the most common approach); and 2) fully-funded systems.

- Pay-as-you-go. In the “pay-as-you-go” system, the amount charged or collected at the beginning of one period is the sum of all the benefits and expenses incurred in the last period divided by the assessment base. In a steady state world, i.e., stable losses or payouts in each year, this would be relatively equitable to all payers (employers). However, in an economy where losses are increasing and it takes many years before some claims are fully paid, this system will shift costs from current employers to future employers.
- Fully-funded. This system attempts to estimate the prospective costs of all benefits likely to be incurred during the upcoming assessment period. Then all payers receiving coverage during that period are charged their shares of these costs.

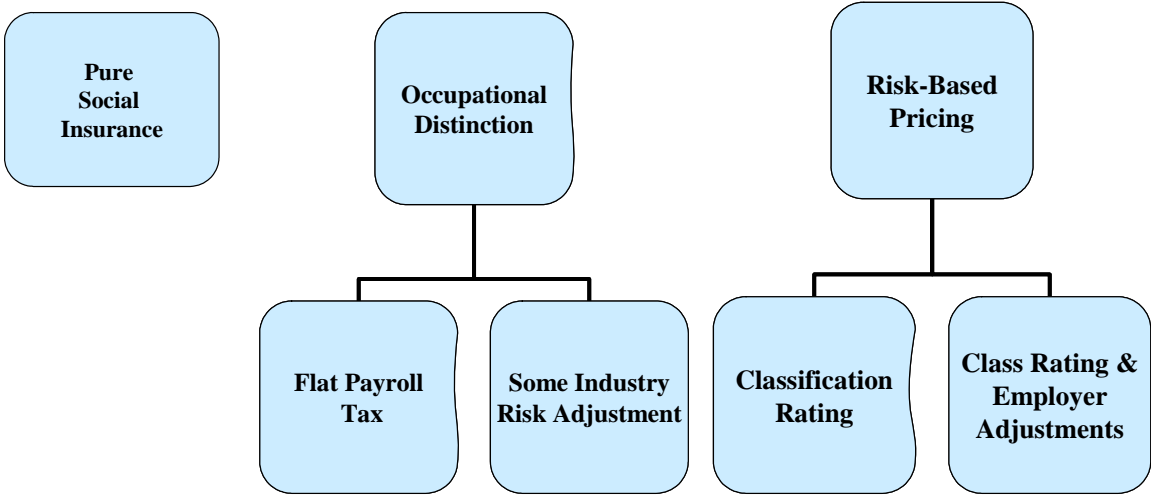
Risk-Based Contributions or Insurance Premiums

The third category of systems tries to closely tie the risk of claims to the employers’ contributions. This category also recognizes a distinct system for occupational injury and imposes virtually all the cost of this system on employers. The key feature of this category is that system funding stresses horizontal equity (in an actuarial sense) among similar employers, i.e., employers with the same level of risk should pay the same cost according to the inherent hazards of a class of employment or the actual loss experience of an employer. This means that higher-risk employers will pay more and low-risk employers will pay less. The rationale for this approach is that risk-based contributions or premiums are more equitable and also promote greater system efficiency by compelling employers to internalize more of the costs associated with their risk level. In theory, this should encourage employers to optimize expenditures on safety and the control of compensation costs.

Risk-based systems are virtually all intended to be fully funded, though as we discuss below, insurers often deviate from fully funded rates. Further, although individual employer equity is desired, practical constraints cause significant differences among jurisdictions with respect to the methods they use to reflect risk factors in contribution schemes.

Among risk-based systems, the US offers the most extreme example of a system that attempts to match employer payments to their expected loss payouts. While each state and territory within the US has an autonomous law and delivery system for workers’ compensation, all of them have a reasonably similar system for recognizing and funding the costs. Canadian and Australian jurisdictions are less uniform in their approaches to

Figure 1
Alternative Workers' Compensation Funding Systems



risk-based rating. The German system is still further removed from the US model. Finally, the United Kingdom has an employer liability system that bears little resemblance to any of the aforementioned countries, but relative risk still plays a significant role in determining an employer's cost for the compensation of injured workers.

Deviations from Social Insurance

There are no universal principles for the design and operation of workers' compensation systems that are widely recognized. Some characteristics considered important in certain jurisdictions are routinely ignored elsewhere. The British workers' compensation act established early in the 20th century seems to be a rough template by which many countries with a "shared history" wrote their workers' compensation laws. Three principles that seem to prevail in these countries are:

- Universal coverage of the program to all citizen/resident workers;
- Benefits set by formula and not closely tied to individual worker losses; and
- Benefits triggered without regard to fault.

On one extreme there are systems that establish a single payer to administer a universally compulsory system with swift payment of statutory benefits without regard to fault (e.g., the State of Washington in the US). At the other extreme there is limited or weak coverage under workers' compensation law, with the primary remedy to the injured worker coming from civil law suites against negligent parties (e.g., India). Most countries' systems lie between these two extremes.

Deviations from universality of coverage abound. Typically, some sectors of an economy may not be covered by workers' compensation law or any other form of social insurance, e.g., domestic servants, agricultural workers, and itinerant workers. In many developing countries a substantial portion of the workforce is considered operating in the "informal economy" outside the reach of government systems for recording accidents, identifying covered workers and employers, and assessing employers for the costs of the system. A study by the International Monetary Fund estimates that 35-44 percent of the economic activity is in the underground economy, not covered by social insurance for occupational disability. On top of this, many sectors of the formal economy are excluded by law from workers' compensation, e.g., businesses without power in India (Schneider and Enste, 2002).

Even in developed countries large portions of the workforce may not be covered, e.g., in Ontario, Canada nearly 40 percent of the workers are not covered by workers' compensation. Finally, even if nominally required to participate in the workers' compensation system, many employers remain illegally uninsured. For workers not covered by occupational insurance, the costs of injury are borne by the worker, family, and charitable institutions. The problem of illegal avoidance of the obligation to contribute to the insurance system is so great that some jurisdictions have set up special funds to pay for the workers' compensation benefits that are unpaid because of the employer's failure to insure.

Second, even if a sector is covered by workers' compensation, many jurisdictions allow the injured worker the right to sue for benefits under civil court systems. In this type of system, fault is an integral consideration in determining how much of a benefit will be paid and by which party (insurance company, employer, or government fund).

The countries allowing civil suits for recovery span the globe and every stage of economic development. Some examples include Belgium, Brazil, Chile, England, Finland, India, Norway, and Panama. In many countries, the civil justice system works in tandem with a government social insurance mechanism. In the United Kingdom, for example, there is a two-part system with public social insurance and private employer liability insurance paying roughly equal shares of the indemnity for workers' compensation benefits.⁴ Lawsuits may or may not modify or forfeit benefits the worker is entitled to under workers' compensation insurance. Hence, the benefit level for a given worker injury is uncertain. And vice versa, if the worker first collects under liability and then seeks workers' compensation benefits, the former offsets the latter.

Where workers' compensation is not the "exclusive remedy" for the injured worker, an employer found to be negligent and required to pay indemnity benefits for an injury may pay twice for that injury: once through workers' compensation assessments and again through a legal judgment and/or legal costs. Also, to the extent that compensation is based on an adversarial dispute in a court of law, benefits and funding are far different than in the more common "no fault" approach to workers' compensation.

The one feature that all workers' compensation systems seem to share is the use of statutory rules to fix the amount and scope of benefits with little or no regard to differences in actual damages suffered by workers in individual cases. Temporary disability is very commonly compensated at a fraction of the pre-injury wage rate, subject to a maximum that typically equals the earnings of the average worker in that jurisdiction. Scheduled benefits are set by law for permanent loss of body parts or bodily systems. Fixed compensation is paid for total disability or death. The medical treatment available is specified. In some limited cases in some jurisdictions, benefits may be adjusted more closely to match the actual economic loss to the injured worker. However, for the most part, payments are set by a formula that approximates fair indemnification for the loss to the typical worker.

Differences in Overall System Funding

The pure social insurance model is generally restricted to small and/or developing economies. Examples of countries that have a single flat employer contribution rate for all social insurance covering both occupational and non-occupational disability and treatment include Iran, Jordan, Qatar, Lithuania, and Nicaragua. The primary advantage of this approach is its ease of administration and the wide social distribution of work injury costs which may be most consistent with a country's prevailing ideology. Also, in less developed economies, imposing a more complex funding scheme may be especially problematic for government administrators. Sophisticated rating systems require verifiable, detailed records for each covered employer and a mechanism for communicating with and collecting data from employers.

When the assessment rate for individuals and employers is a fixed rate not connected in any way with workers' compensation losses, important economic problems arise:

- there is no incentive to control workers' compensation losses so as to minimize assessments,;

⁴ The UK system has an interesting twist because it allows for tort actions by the liability insurer against the employer-policyholder for breaches of duties to avoid accidents and handle claims properly.

- cross subsidies flow from low-injury to high-injury employers; and
- there is no connection between the assessment and the adequacy of revenues to fund workers' compensation obligations.

If a segregated fund is established to pay for workers' compensation benefits, a crucial public policy issue turns on how to make contributions to this fund so as to guaranty benefit obligations. Public policy must determine if the fund will be replenished on a “pay-as-you-go” basis or require annual contributions that match the actuarially expected benefit obligations that will be incurred during the assessment period. The pay-as-you-go approach is widely used even in developed economies for things such as social retirement benefits. Workers' compensation is somewhat different in the sense that employers' efforts to promote safety and reduce losses can be an important factor affecting system costs.

When private insurance is used to fund benefits, the premiums charged should, in principle, cover the anticipated benefits incurred. Public funding is much more likely to intentionally or unintentionally allow for partial funding of incurred obligations or pay-as-you-go funding. Public systems, particularly if they have embraced a pay-as-you-go approach, have a greater tendency to amass large under-funded liabilities over the course of many years of inadequate premium charges.

The other major public policy decision concerns the roles of employer, workers and the government in funding the system. Even in pure social models, employers are charged for the bulk of the costs of social insurance. Workers may contribute to some forms of social insurance, but rarely if ever to workers' compensation insurance.

When under-funding reaches crisis proportions, inter-temporal employer subsidies become necessary. That is to say, years after the deficits are created in adequate rates, employers at a later time are charged more than their expected losses to make up for the deficit. If these deficits are large and portend subsidies of present employers by future employers, it can discourage investment by existing and potential enterprises. Finally, the central government is subject to considerable fiscal uncertainty because it may be held accountable for bailing out a failed social insurance system.

Full funding of obligations for private insurance means that a competent authority must estimate the ultimate cost of expected claims during the period for which a premium charge applies. Typically this is done by analyzing historical loss experience and making adjustments for trends or anomalies in the historical data. Often, 3-5 years of historical system losses are developed to their ultimate loss payouts. Then, these 3-5 historical periods are examined to see if any trends can be detected for the purpose of projecting a loss per dollar of payroll in the new policy period for which a rate is needed. Government funds may be less formal in setting rates. Some Canadian workers' compensations boards set rates on the basis of recent losses paid (pay-as-you-go component) with an additional factor to contribute to any funding deficit in previous policy years (concession to “full” funding). Similarly, the Italian National Employment Accident Insurance Institute computes the initial rate on a pay-as-you-go basis, but adds to the rate the cost of fully reserved accident pensions incurred in previous years.

Public systems with the highest degree of full funding of obligations seem to share the following characteristics:

- There is a clear actuarial basis for rate setting.

- The actuarial formula is periodically reviewed by an independent actuarial consultant.
- Future gains from invested assets and reserve development are conservatively estimated.
- Most importantly, the government administrative agency is under a statutory mandate to engage in full-cost pricing with little or no discretion to deviate.

In systems that rely on private insurers to pay for benefits, fully funded rates should be the norm. Otherwise, investors would withdraw their capital and/or insurers' stock value would decline. However, private insurers also often miss the mark in setting actuarially correct rates, both as individual companies and industry wide. Some cross subsidies from one class of employer to another also may exist, but with the intention that aggregate premium volume should cover aggregate costs. Private insurers cannot accumulate losses or subsidize premiums for very long before their financial viability is threatened. Insurer withdrawal or insolvency put the ultimate brakes on underpricing. Capital losses due to underpricing reduce underwriting capacity and eventually correct any market-wide pricing deficits driven by the "underwriting cycle" or short-sighted rate regulation. A combination of capital losses, regulatory discipline, and/or investor pressure on insurer management eventually restores adequate pricing.⁵

Differences in Employer Charge Backs

Classification and Rate Relativities

As explained above, all but the "pure social model" of workers' compensation systems charge employers the costs of maintaining the benefits and administration of the system. In nearly every jurisdiction these charges bear some relation to the hazard or risk of employee injury faced by an employer or group of employers. The first and most common system for accomplishing this is to group all covered employers into classifications that reflect similar types of operations or employment. Then the various classes are charged rates that are associated with their relative risks of injury or claims cost. Sometimes this matching of assessment rates with risk is very approximate. At times it may be shaped by political considerations. Table 2 illustrates the range of detail and discrimination among some jurisdictions in the classification of employment for purposes of assigning assessment rates.

The US, Canada, Australia and New Zealand have a large number of detailed classifications, but do not use the same definitions of classes. Countries with smaller and/or less developed economies tend to employ fewer and less detailed rate classifications.

Over and above classification rates based on loss experience, jurisdictions commonly adjust the class rates to provide incentives to participate in safety programs. In Canada, for example, the Province of Alberta adds a surcharge to class rates to fund safety association programs. These are applied by industry and not all industries within a rate group are subject to such levies.

⁵ The term "underwriting cycle" refers to the tendency of some commercial insurance markets to undergo periods of lax underwriting and underpricing followed by periods of tighter underwriting and higher prices (see Klein, 2004 for a more detailed description of this phenomenon).

In addition to these targeted surcharges and incentives, it is common to expand the payment by employers in all classes by a uniform surcharge. Examples of these surcharges include:

- The Dust Diseases surcharge in New South Wales, which is levied from time to time as funding needs arise;
- Occupational health and safety loading on assessed premium in South Australia and New Zealand; and
- The Fishermen’s fund assessment in Alaska to fund medical treatment for alien offshore fisherman.

Table 2
Number of Classifications and Rate Ranges
In Selected Jurisdictions

Jurisdiction	Approximate Number of Classes	Approximate Range of Class Rates as % of Payroll
US states	600-850*	.3 – 70.0+
Canadian provinces	200-400*	.25- 9.00
Australia	700-800*	.3 – 11
Belgium	1,000	.5 – 10.0
New Zealand	>500	.1 – 8.0
Finland	250	.3 – 4.0
France	1,100	0 – 4.0
Germany	~100*	average 1.33
Indonesia	5	.24 – 1.74
Mexico	50	NA
Russia	22	2.0-8.0
Costa Rica	10	2.0-3.0
Burma	10	Average = 1.0

* Depends on the state, province, or German Berufsgenossenschaften.

Source: websites and source documents of countries shown

Highway accidents while commuting to work are covered in most European jurisdictions and in many other parts of the world. A flat surcharge on the wage base is often added to cover these injuries, presumably because they are considered risks apart from the employer’s onsite operations and uniform across all employees.

In our review of classification rates, the US had the greatest range of difference between the lowest industry class rate and the highest. Given the strong reliance on loss data and well accepted actuarial methods to compute these class relativities in the US, this suggests that most other countries may subsidize the highest-risk industries in their class rate structure.

Actuarial principles may bend to employers’ opinions and acceptance of classification systems. For example, a study of class rate making for the British Columbia Board found “universal suspicion and distrust of the Assessment Department among the employers of

British Columbia” (British Columbia Workers Compensation Board, 1999). This lack of public confidence forced the Board to completely overhaul its class system. It reviewed and expanded its codes to better match hazards and it also instituted a system of making adjustments to classes, especially if their loss experience is volatile or systematically worse than expected. Since the 1940s, the Ontario Board has experimented with several different systems of experience rating and was on the verge of abandoning the system. It now has a unique system for the construction industry and has eased the inclusion of some employers on a voluntary basis.

Most developing countries do not have the administrative resources to establish actuarially sound classifications and rate relativities. Describing Zimbabwe specifically and southern Africa generally, Kaseke and Ncube (2003) comment:

Research on work place risks is also needed in order to provide a scientific basis for determining insurance premiums paid by employers. Currently, there is no clear appreciation of work place risks. In many instances, this results in a discrepancy between the level of risks and the premiums payable. The sustainability of the scheme depends to a great extent on generating scientific data on work place risks which then provide a framework for determining premiums.

Even many developed nations do not have systematic, actuarial methods of assigning the costs of workers' compensation to employers. In a survey conducted by the Casualty Actuarial Society based in the US, only a handful of the respondents from 17 jurisdictions reported that an actuarial system of rate classification was in use in their workers' compensation scheme.⁶ The results of the survey are presented in Wilson (2000). Generally, risk classification systems are developed by individual insurers with no government approval required. That same survey found “There are generally no published statements or principles for property and casualty risk *classification* systems.” (Wilson, 2000).

Smaller economies, or those with less information technology at their disposal, typically opt for a simpler class structure, i.e., 5-12 broad classes, with a very small range of difference from the lowest to highest class. Presumably, large industries with significant export potential are given favorable class rates regardless of their loss experience. This cross subsidy may be tolerable, or necessary, from a political perspective.

Classification systems in developed economies tend to have the following elements:

1. Classes group public and private organizations by means of the principle service or product produced by that organization, not by the types of trades or jobs of the employees. Adjustments to this rule include:
 - a. Special classes of workers can be carved out for a lower rate, e.g., office clerical workers, maintenance, and salespeople.
 - b. Some jurisdictions will make exceptions and allow an employer to have more than one primary class code, but require the associated payroll information to be kept separately.

⁶ The Casualty Actuarial Society (CAS) is based in the US with its offices in Arlington, Virginia. More information about the CAS and its research project can be accessed from its website at www.casact.org.

2. A detailed manual or procedure for the assignment of employers to classes is often published by the regulatory authority. Commonly, the workers' compensation regulator simply adopts an industrial classification system developed by another agency for the collection of national economic data. The manual is used to forestall disputes and evasive behavior when rates are very different across related types of industries, e.g., types of building construction.
3. Class codes often follow national statistical systems for classifying businesses, e.g., Statistics Canada's Standard Industrial Classification system or the Australian New Zealand Industrial Classification System. Deviations from the standard product classifications are frequently made on the basis of hazards and risks, e.g., underground versus open pit mining of the same mineral.
4. The range of distinct classes is 400 to 900 codes. Roughly 300-400 codes would be recognizable and similar across jurisdictions. Generally, significant industries in the local economy are assigned their own class codes, e.g., vodka production in Russia and tar sands extraction in Alberta. Distinct business classes with few employers are either merged into another class or are assigned little credibility in ratemaking.
5. There are two systems for assigning rates to class codes:
 - a. Aggregate loss experience is allocated to all classes on the basis of the relative weights of each classes' recent loss experience.
 - b. A rates is developed separately for each class develops based on its own loss experience.
6. Successful class rating systems benefit from a central entity to gather loss statistics from all employers, analyze the experience, and promulgate class tables and definitions. In private insurance based systems, this is often done by an industry service bureau.

Experience Rating

The next area for comparing jurisdictions is whether and how they add a component for individual employer loss experience. These mechanisms are called by different names - bonus/malus, experience rating, merit rating - but essentially seek to accomplish the same thing. They all try to equalize the payment of each employer relative to the losses they *are expected* to generate for the system.

Experience rating is an important element of many workers' compensation pricing systems that is intended to further tailor an employer's premium to match its risk of loss. In essence, experience rating adjusts an employer's effective rate upward or downward according to whether its historical loss experience has been higher or lower than that reflected in its classification or "manual" rate (i.e., the rate published for each classification in a rating manual). In this sense, experience rating recognizes and attempts to at least to partially account for variation in loss experience and risk among employers in the same business classification. Moreover, to the extent that an employer has some control or influence over its risk and claims experience, experience rating can provide substantial financial incentives for it to improve worker safety, decrease worker accidents, and reduce its claim costs. These incentives would be expected to motivate employers to facilitate injured workers' return to work, as well as prevent worker accidents.

Actuarial criteria for judging a system of experience rating system include:

- correction of the variance of employer's loss experience with group/class experience;
- neutrality with respect to overall class rate relativities;
- ease of understanding for employers;
- ease of administration by insurer/government fund;
- ability to predict future loss experience (in fully funded prospectively rated systems); and
- reasonable stability in rates from year to year.

To this list a safety expert or policymaker might add the criteria of promoting safe practices and safety investments by employers.

There are necessary tradeoffs among some of these criteria. For example, a predictive system may be data intensive and require high administrative costs, or a stable system may be less sensitive to recent improvements or deterioration in safety practices and injury rates.

Among the countries with sub-national administration of workers' compensation (US, Canada, and Australia), the US system is by far the most universal and uniform with respect to experience rating throughout the sub-national systems. In experience rating, the actual payroll and loss data of an individual employer are analyzed over a period of time. In the US and commonly elsewhere, the latest available three years of audited data for a specific employer are compared to the data for similarly grouped firms to calculate the employer's experience modification. Because of issues related to statistical credibility, experience rating is not applied to small firms - minimum premium standards determine whether a particular firm is large enough to qualify for experience rating.

In the US, the basic formula is:

$$\text{ERMF} = (\text{ALR} - \text{ELR})/\text{ELR}$$

Where:

ERMF = experience rating modification factor

ALR = actual loss ratio

ELR = actuarially computed expected loss ratio

The ERMF is multiplied times an employer's "manual premium" (the employers' covered payroll multiplied times the assigned classification rate). If the ERMF is less than 1.0 then the employer's experience-adjusted premium is less than its manual premium. Vice versa, if the ERMF is greater than 1.0 then the employer's experience-adjusted premium is greater than its manual premium.

Several Canadian provinces use an experience rating formula similar to that used in the US, but they add some "tail end" multiplicative adjustments:

The Canadian formula is:

$$\text{ERMF} = ((\text{ALR} - \text{ELR})/\text{ELR}) \times \text{Participation Factor} \times \text{Eligibility Factor}$$

Where:

Participation Factor = amount of standard premium charged to employer; the larger the premium the greater the factor

Eligibility Factor = number of years the employer was in the experience program, e.g., 1 year is a factor of .33 and 3 years is a factor of 1.0

In addition to the above experience modification, several Canadian provinces impose extra surcharges and penalties on employers with particularly bad safety performance. Queensland has an interesting variation on experience rating that makes use of credibility theory and the need for stability in experience modifiers:

The Queensland formula is:

Premium = (Experience Factor x Weighting Factor) + (Risk Factor x (1-Weighting Factor))

Where:

Experience Factor = the previous 2-4 years of claims experience compared to the class average claims experience

Weighting Factor = a factor that increases as the size of the employer's payroll increases

Risk Factor = the change in the class rate over the past two rating periods (used as the complement of the employer's own experience

Additionally, a number of countries apply complete "self rating", a system in which an employer's rate for the next year is based on the last year or two of its own claims experience (e.g., Japan, Thailand). If one sets the threshold of employee size high enough, self rating can be credible and reasonably stable.

Some common features of experience rating systems include:

- use of 2 -3 years of historical claims experience;
- capping individual claims in computing actual losses (e.g., US, Canada, NSW);
- eliminating very small employers from the program (2-3 employees); and
- assigning more weight to the experience of larger employers. (In many jurisdictions, large employers are self rated on the basis of their own recent losses).

The German system also has detailed class rates and a system of credits and debits based on loss experience. Each of the 26 Berufsgenossenschaften can determine its own formula. Some only award discounts for good performance, while others have experience-based debits and credits to the standard rate.

Finally, experience rating systems or surcharge systems rely on credible and consistent data on claims costs across employers. Absent such statistics, developing countries may impose much less-refined systems of experience rating based on either: 1) absolute numbers of claims in the previous 1-2 years; or 2) an employer's own rate of change in claims experience. For example, Zimbabwe reports that it penalizes employers whose own loss experience grows too rapidly over the previous year.

It should be noted that most US, Canadian, and Australian systems only subject 10-15 percent of the employers to experience rating of any sort. This is due to the lack of credibility for small employer loss experience. Even if nominally experience rated, most

formulas have weighting factors that reduce the effects of a smaller employer's own experience relative to the experience for its rating classification.

In summary, common features of experience rating systems include:

- use of 2 -3 years of historical claims experience;
- capping individual claims in computing actual losses (e.g., generally in the US and Canada, and NSW);
- eliminating very small employers from the program (2-3 employees); and
- assigning more weight to the experience of larger employers. (In many jurisdictions, large employers are self-rated on the basis of their own recent losses).

Outside of the US, there is very little literature evaluating the success of experience rating in producing more equitable rates, safety, administrative ease, employer acceptance or other criteria listed at the start of this section. Klein and Krohm (2006) reviews the literature on the effects of experience rating on the incidence of worker injuries.

Equity and Competitiveness

An important consideration in funding mechanisms is how they affect employment and economic activity. A poorly designed funding mechanism may distort the competitive balance in the local economy among various classes of employers, e.g., large versus small or urban versus rural. If the funding mechanism increases the costs of a major exporting industry to an extent that its owners complain that they can no longer operate competitively, the government may concede to the industry's demands for rate relief. Because of the importance of local jobs especially in highly competitive industries and international trade dependent economies, politics is seldom far removed from rate setting in workers' compensation, or other employment based social insurance.

Influencing Safety

In addition to adhering to meeting funding objectives and adhering to equity principles, another important objective of rate setting is improving the safety of workers and thereby controlling system costs. This section examines the financial and regulatory incentives employed in various countries to bring about safer workplaces and lower injury frequency and severity. These incentive schemes seek to link employer payments to: 1) their loss experience, and/or 2) specific actions with respect to safety at work. These two methods may not be linked.

Governments controlling workers' compensation systems have a financial stake in controlling the level of compensable losses, without jeopardizing the rights of injured workers to file valid claims and receive the compensation due them. Even if employers (not the government directly) fund the cost of occupational insurance, shortfalls in funding will necessarily require government bailouts of failed systems. Additionally, a relatively high cost of compensation (due to suboptimal safety measures and investments) borne by employers makes the economy less competitive internationally and goods more expensive domestically. Wright and Marsden (2002) summarize their survey of international workers' compensation rate levels:

Employers in some of the countries surveyed have reacted negatively to workers' compensation when the cost starts to exceed a certain level, typically an average of about 3% of payroll. (Note that an average cost of 3% across all firms can encompass rates of 8% for higher risk sectors such as construction.) The costs are then characterised by employers as unaffordable. Reactions may include seeking relocation, contesting a higher proportion of claims and lobbying for a change in rules. This has led to reforms in countries such as Australia including reducing benefit levels, limiting the range of conditions that are compensated, restricting access to legal procedures, and tightening rules for establishing if a condition is work related.

Thus, for a variety of reasons, even the poorest countries with the most basic occupational compensation systems create incentives to promote safety and loss control among covered employers. Those countries may also fear that social instability will increase if work accidents are significant in number and are publicized domestically (currently a major issue in Bangladesh). South African countries, for example, which have rudimentary workers' compensation systems, still use factory inspectors to enforce safety codes and practices (Kaseke and Ncube, 2003). Industrialized countries uniformly apply detailed regulations governing the safety of workplaces.

One of the effects of a charge system is the modification of behavior by those being taxed, charged, or assessed (for simplicity we use the term "assessment" to broadly describe all of these). Assessment mechanisms may influence safety only if they are tied to individual employer behavior or safety performance. Even an extremely high class rate - higher than all other employer classes - presents no direct incentive for allocating additional operating expense on safety if it is regarded as a fixed cost beyond the control of the firm.⁷ For insurance rates to affect behavior, management must see a connection between what they do to control compensable losses and what they pay for the workers' compensation system.

Throughout the world, government safety incentives not tied to claims, or loss experience, are more common than experience rating. These government-sponsored incentives include:

- Direct subsidies for installation of safety related equipment or processes;
- Reductions in workers' compensation assessments or premiums for completion of safety certification programs;
- Discounts to employers that participate in industry specific safety programs; and
- Targeting enforcement or mandatory remediation programs by safety regulators based on claims experience.

New Zealand offers a prime example of a country that uses a mixture of such programs. The Accident Compensation Corporation (ACC) does not use individual experience rating of employers, but does use a three-fold incentive program directed at encouraging specific safety initiatives or penalizing poor safety records (described in Klein and Krohm, 2006).

⁷ However, indirectly, employers paying higher class rates may achieve a greater premium reduction from a given safety investment, all other things equal.

There are numerous other examples throughout the world of credits being given to employers that participate in safety programs:

- Some US states (e.g., Delaware, Florida, New York, Missouri, and Massachusetts) allow rate credits for employers that hire qualified safety consultants to establish well defined and implemented safety plans.
- Many US states offer credits for “drug free workplace” programs.
- Obtaining certifications or proof of completion of safety training entitles employers to credits (e.g., a “Certificate of Recognition” can get an employer a 10 percent assessment credit in the Province of Alberta).
- A large number of jurisdictions have industry specific safety programs that offer credits to firms that follow approved practices developed for their special industrial hazards (e.g., the majority of US states and Canadian provinces have such programs).
- The bonus/malus system used for some industry sectors in Germany is yet another example of industry specific programs to award credits (bonus) or debits (malus) for specific practices within an industry, e.g., using foil knives in the butchery sector earns bonus points. This comes close to what many US insurers do with “schedule rating,” i.e., a schedule of credits and debits based on an employer-specific risk characteristics.
- Special grants for implementation investments in targeted safety technologies. Denmark offered grants to firms that were targeted at reducing repetitive motion injury. Netherlands offers tax incentives for qualifying investments in safety.

In addition to credits, some jurisdictions add special penalties for employers with poor claims experience, over and above individual experience rating: Nova Scotia and Ontario have special surcharges and penalties for employers with high injury rates in addition their regular experience rating programs.

Another incentive not linked to insurance is enforcement of safety codes and mandated practices. Fines for safety code violations may exercise a strong influence on employer behavior. However, as with other regulatory enforcement activities, government authorities must exercise a credible threat of enforcement and be honest and fair in the application of fines. A downside of inspections and fines is the hostility created among employers toward the government safety inspectors.

Systems that penalize employers for poor safety records have the perverse effect of motivating employers to not report claims and to encourage workers to not report them. The ISSA Technical Commission on Insurance Against Accidents at Work and Occupational Diseases (2003) identified underreporting of work injuries as a top priority across countries with very different systems of social insurance. Many developing countries have absurdly low rates of reported injury reported to the International Labor Organization. Gambia, for example, has had only one occupational disease claim filed between 1996 and 2003 (ISSA, 2003). The problem of non-reporting appears to plague both developing countries and advanced economies with sophisticated risk-based pricing systems.⁸

⁸ Kim (2005) describes widespread non-reporting in South Korea to avoid special safety inspections and costly remediation orders. Kaseke and Ncube (2003) reports non-reporting for similar reasons in Zimbabwe. The ISSA Technical Commission on Insurance Against Accidents at Work and Occupational Diseases (2003) identified underreporting of work injuries as a top priority across countries with very

Other jurisdictions provide grants or other financial incentives to employers that invest in safety. These incentives are not necessarily tied to loss experience. The 26 German Berufsgenossenschaften (BGs) invest on average about 7 percent of premiums in *their* prevention efforts (promotion, research, training, etc.). Investments in equipment or system redesign are borne by employers, not by the BGs. By contrast, US workers' compensation insurers probably spend less than 2 percent of premium in prevention. Employer trade groups may also offer positive incentives to their members for employing safe practices or investments in safety.

Another way to reduce the overall loss payouts of a workers' compensation system is to return injured workers to gainful employment as quickly as possible. Many different types of incentives are used by governments to motivate employers to bring injured workers back to work. For example, the law can make the level of permanent disability compensation a function of whether the worker returned to his/her pre-injury job. Another approach is to subject claims for a hearing on loss of earning capacity and/or vocational retraining if the worker does not return to his/her pre-injury job and wage rate. A number of states in the US including Oregon offer a return to work financial incentive that is available to all firms that rehire seriously injured workers, regardless of loss history. Unfortunately, many of them have not been very effective in inducing employers to employ previously injured workers

At the basis of most incentives is tying the cost of disability compensation to the post healing job status of the injured worker. Rehabilitation and return to work makes greater financial sense if it is rewarded with lower indemnity payments. This is especially true in systems like Germany, much of Canada, and many of the US jurisdictions where the goal of rehabilitation and return to work is given great weight in determining compensation, i.e., final compensation is decided after completion of a rehabilitation process. Wright and Marsden (2002) observe that in some countries, such as Australia, there can be conflict between the goals of rehabilitation and compensation because an adversarial system exists for awarding compensation that drags out settlement and discourages offers by employers to return workers to their pre-injury work.

Other incentives not tied directly to rating are include:

- Employers that have poor safety records can be denied coverage by private underwriters. In the US, this forces rejected employers to seek alternative coverage in government insurance plans, typically at higher costs. In other countries with private insurance systems, an employer's rejection by the insurer of choice requires shopping for coverage, often from companies with poorer service or higher prices.
- Companies with high claims may have difficulty doing business with partners and consumers that require ISO certification or other objective evidence of well managed operations. At least in the US, many businesses will not accept bids for services from vendors with poor experience rates, presumably this is taken as a sign of poor management.

Finally, exposing employers to lawsuits from failure to comply with safety measures can be a powerful motivation to avoid practices that could be deemed unsafe or negligent.

different systems of social insurance. Gambia, for example, has had only one occupational disease claim filed between 1996 and 2003 Allegations of employer non-reporting have been widespread and chronic in the United States.

Rather than appealing to the positive results of safety initiatives, civil suits may motivate employers to avoid acts that cannot be defended in court. Employers Liability Insurance in the UK and much of the continent of Europe covers the employer against civil actions by their injured employees. The evidence as to whether tort liability serves as an incentive for safer workplaces is sketchy at best, however.

Trends in System Design

There is some indication that workers' compensation systems in countries with developed economies are undergoing an incremental shift toward privatization and greater refinement of pricing/contribution systems. In the past ten years, Norway and Argentina have embraced private insurance models. Two US states and one Australian state have incorporated private insurance in lieu of exclusive government funds. The only major case of socializing a private system is the New Zealand's flip-flop from public to private back to public in 1996-97. Most recently, in countries with economies that are at a lower stage of economic development or are transforming from planned to market-based economies, governments have tended to opt for public systems, e.g., eastern European economies, new EU member states, and certain African countries. This is consistent with the path of evolution of workers' compensation funding mechanisms that we describe below.

Concurrent with these trends is the move toward fully-funded systems, i.e., employers pay for the full cost of benefits and subsidies from national treasuries and/or future employers are diminished or eliminated. The two may be causally related. Systems that employ risk-based rates or insurance premiums seek to charge insureds a rate that will cover all costs, including the cost of capital if risk is underwritten by private insurers.

In part, these changes are likely due to the maturation of these economies from "developing" to "fully industrialized", such as in South Korea. Developed economies with more advanced accounting and communications systems can better support the information demands of private insurance systems. Another impetus for change comes from dissatisfaction with the old regime of social funding and administration of insurance, as in Argentina. Globalization and greater international competition among firms and industries may be another factor influencing the movement to optimize systems and adopt elements of the most successful international models.

As different nations' economies grow together and non-governmental organizations gain influence, standards for workers' compensation insurance and workplace safety are increasingly being defined across national borders (Munich Re, 2000).

As an economy develops, moving from an agrarian base to greater industrialization, its system for occupational injuries seems to develop along the following stages. First, coverage is extended to all employers. Second, a separate system of funding workers' compensation is put in place. Third, the system of charges grows in the refinement of how funds will be raised to support the system. With respect to funding, the trend clearly seems to be to have employers pay for virtually all of the direct costs of compensation.

As an economy grows, the employer tax/assessment system becomes more complex and sophisticated. This trend seems to naturally draw from two forces: 1) the demands of employers for horizontal equity with their peers, and 2) the administrative capacity to

support a more refined system (e.g., computer systems and well trained civil servants). Sophisticated pricing also depends on equally sophisticated systems for accident classification and reporting. Clear rules need to be developed and employers educated as to their application.

Finally, credible actuarial classification systems may be equitable, but they also may increase costs for high hazard industries. There may be a desire to relieve cost pressures on exporting industries in internationally competitive markets. This desire may lead to the creation of cross subsidies in system funding mechanisms. This can be viewed domestically as an economic development tool or as an unfair trade subsidy by competitors. At the same time, as a country's economy expands and harbors a more diverse set of exporting industries, pressures may increase to reduce cross subsidies to industries that received favored treatment historically.

Conclusions

Most industrialized nations charge employers for the cost of benefits and administration of the workers' compensation system. As an economy grows in size and complexity there seems to be a tendency to increase the detail and sophistication of the classification system used to allocate total system costs to employers according to their estimated risk levels. The primary elements of a more refined assessment/pricing systems are classification rating, experience rating, and other adjustments to reflect individual employer risk and safety efforts.

At the same, there is considerable variation in how various countries structure these elements. This variation reflects differences in economies, philosophies, political considerations and the limits of actuarial science. Even with access to extensive and detailed data and "state of the art" actuarial methods, judgment and policy considerations necessarily play significant roles in a country's system. Hence, government officials maintain a strong interest in looking at other countries' systems to glean ideas that they may wish to incorporate into their own schemes.

Does the insurance model create better incentives for safety than other models? Risk-based pricing of insurance has strong theoretical appeal to economists and intuitive acceptance by risk managers and insurance professionals. Yet, the empirical evidence quantifying its impacts on safety, while somewhat supportive of a positive impact on safety, is limited. Some jurisdictions stress education of employers and promotion of a culture of safety or sanctions for violations of safety regulations that may achieve the same results. These safety programs may be used in addition to or in lieu of experience rating.

In sum, there is much to be said in favor of refined risk-based pricing systems for workers' compensation but there is no widely accepted "perfect system" that maximizes all of the desirable objectives. There are a number of practical constraints, issues and tradeoffs that must be resolved as countries seek to improve their systems to best fit their needs and circumstances.

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