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**PAYROLL TAXATION
AND EMPLOYMENT:
A LITERATURE SURVEY**

*Occasional Paper Number 15
December 1996*



Industry Canada Industrie Canada

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by Joni Baran, Industry Canada

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EXECUTIVE SUMMARY

Since the early 1980s, chronic unemployment problems in Canada, as well as in most other industrialized countries, have prompted a heightened interest in the empirical research of the causes of persistent unemployment. Among the areas examined has been employer payroll taxes and their effect on job creation. Although research in this area has been relatively sparse, it has become a more popular area of study in the 1990s.

This paper is a survey of the more noteworthy analysis performed in this area with an emphasis on Canadian empirical research. The objective is to provide a single locus where much of the work relating to the impact of payroll taxes on employment can be presented and from this, to draw conclusions.

Part 1 gives a brief overview of federal payroll taxation in Canada and the perspectives of various stakeholders with respect to the impact of payroll taxes on employment. Part 2 provides an economic primer designed to familiarize the non-economist reader with the concepts and terminology referred to later in the paper.

Much of the earlier work on payroll taxes was surveyed by Bev Dahlby for the Ontario Fair Tax Commission and the Canadian Tax Foundation, by Daniel Hamermesh in his book *Labor Demand* and in the OECD Jobs Study publications. These surveys are summarized in Part 3 of the paper. Further empirical analyses, published since the above-mentioned literature surveys, which have focused on Canada in particular, are surveyed in Part 4. The OECD Jobs Study and a working paper commissioned by the study, as well as research done by Beach, Lin and Picot (1995); Di Matteo and Shannon (1995); Wilton and Prescott (1993); Parker (1994); and Cozier and Mang (1993) are included in the survey.

The consensus of the surveyed literature is that increases in employer payroll taxes tend to have negative short-term effects on employment. Most of the evidence, however, concludes that adverse employment effects do not persist in the long run. Additionally, most research tends to support the notion that payroll taxes levied on employers have a greater negative effect on employment than employee payroll taxes. Although there has been no empirical work which examines the employment stimulation effect of a *decrease* in employer payroll taxes, conventional economic theory suggests that the effects would be less than the corresponding job loss associated with a payroll tax increase.

Earnings ceilings on Unemployment Insurance (UI), now known as Employment Insurance, and the Quebec/Canada Pension Plan (Q/CPP), the federal programs funded by payroll taxes, create a situation where the marginal tax rate with respect to these payroll taxes is higher for low income earners than for high income earners. Hence, any increases in employer payroll tax rates will have more of an impact on workers whose incomes fall below the ceilings. This is somewhat troublesome given that unemployment is concentrated among low income, low skilled members of the labour force.

Employer payroll taxes are likely to affect small businesses differently than large businesses for several reasons. Payroll taxes constitute a much larger proportion of total taxes for small businesses; compliance and administrative costs are higher; smaller businesses tend to be labour intensive and to hire more low income, low skilled employees; short-run market adjustment effects can have a more onerous cash-flow impact on small businesses; and payroll taxes are profit insensitive. On the other hand, small businesses are less likely to be unionized and, therefore, are more able to pass employer payroll tax increases back to workers.

Separate from the survey of this literature, it is interesting to note that other industrialized countries, as well as some Canadian provinces, have adopted targeted payroll tax rate reductions in an attempt to mitigate any negative employment effects associated with payroll taxes.

PART 1: BACKGROUND

The first payroll taxes in Canada were introduced in 1915 to fund a workers' compensation program in Ontario. Federally, payroll taxes were first introduced in 1940, with the implementation of an Unemployment Insurance (UI) program. Premiums were levied on both employees and employers to fund the program. In 1966, payroll taxes were imposed, again on both employees and employers, to finance the Quebec/Canada Pension Plan (Q/CPP). Since then, several provinces have imposed payroll taxes to fund programs such as workers' compensation and health and education spending. This paper focuses on payroll taxes levied at the federal level.

UI and Q/CPP payroll levies operate in a similar manner. Both employees and employers contribute to each program. Under UI, the employer's premium is 1.4 times that of the employee, up to maximum insurable earnings.¹ The contribution rate for Q/CPP is the same for the employer and the employee, up to maximum pensionable earnings.²

Payroll Taxation in Canada

The level of payroll taxation in Canada rose from 1.9 percent of wage income in 1961 to 10.3 percent in 1992.³ Total payroll taxes in Canada constituted 5.9 percent of Gross Domestic Product (GDP) in 1993. Although this is relatively low compared to other industrialized countries (see Table 1⁴), the increase in payroll taxes as a percent of GDP has doubled since 1970.

It is also interesting to note that Canada collects a relatively large share of its payroll taxes from employers. In fact, among the G7, Canada is second (along with France) only to Italy, in this respect.⁵ (See Table 2)

UI premiums comprise the largest component of payroll taxes, and the increases in UI contribution rates have been the main catalyst behind the increase in the absolute level of payroll taxes. In fact, increases in the UI component accounted for almost one half of overall payroll tax increases in the 1970s, one third in the 1980s and three quarters in the 1990s.⁶ UI premiums accounted for 42 percent of total payroll taxes in 1994 and are the largest source of federal revenue next to personal income taxes.⁷ UI premium rates are set annually.

Q/CPP contribution rates are set according to the actuarial rate for the plan which is reviewed every five years. Increases in contribution rates are part of a long-term schedule, designed to maintain the viability of the plan. The growth in Q/CPP contribution rates has been marginal to date. However, the schedule derived by the Canadian Institute of Actuaries projects combined employee–employer contribution rates to increase from 5.4 percent in 1995 to 12.8 percent in 2021.⁸

Revenues from employer and employee payroll taxes combined have increased tremendously since the 1960s. Lin, Picot and Beach determined that total payroll taxes per employee, expressed in 1993 constant dollars, have risen from a national average of \$803 in 1966 to \$3273 in 1993.⁹ An interesting point is raised by Dahlby in his analysis of payroll taxes

in Ontario. Dahlby found that, for a married taxpayer with two dependent children in Ontario in 1991, the combined UI and CPP contributions exceeded personal income tax payments for workers with incomes in the \$20,000 to \$27,000 range. Additionally, the combined employer–employee contributions exceeded personal income tax payments for the same taxpayer with an income below \$30,000.¹⁰

Table 1
Social Security Contributions* as Percentages of GDP by Country, 1965-1993

	1965	1970	1975	1980	1985	1989	1990	1991	1992	1993
Australia	-	-	-	-	-	-	-	-	-	-
Austria	8.6	9.1	10.7	12.7	13.7	13.7	13.6	13.7	14.3	14.8
Belgium	9.8	10.9	13.3	13.5	15.7	15.3	15.4	15.9	16.0	16.3
Canada	1.4	3.0	3.3	3.3	4.5	4.7	5.2	5.7	6.0	5.9
Denmark	1.6	1.6	0.5	0.8	1.9	1.4	1.5	1.5	1.6	1.6
Finland	2.1	2.9	5.7	7.2	7.1	8.6	9.9	11.3	10.9	12.1
France	11.8	12.7	15.0	17.8	19.3	19.2	19.3	19.2	19.4	19.6
Germany	8.5	10.0	12.2	13.1	13.9	13.9	13.7	14.7	14.9	15.1
Greece	6.9	7.6	7.5	9.7	12.5	11.8	11.7	12.4	12.7	13.9
Iceland	2.1	2.2	0.8	0.6	0.7	0.8	1.0	2.2	2.5	2.5
Ireland	1.6	2.4	4.1	4.6	5.3	5.1	5.2	5.4	5.5	5.6
Italy	8.7	9.9	12.0	11.5	12.0	12.5	12.9	13.1	13.3	17.7
Japan	4.0	4.4	6.1	7.4	8.4	8.6	9.1	9.3	9.4	9.8
Luxembourg	9.9	8.8	12.6	13.5	12.5	11.5	11.6	11.9	12.3	12.7
Netherlands	10.1	13.0	16.5	17.1	19.5	18.5	16.7	17.6	18.3	18.3
New Zealand	-	-	-	-	-	-	-	-	-	-
Norway	4.0	6.3	11.1	9.9	9.8	12.5	12.1	12.2	12.4	11.5
Portugal	4.0	5.5	8.5	8.5	8.2	8.1	8.4	8.6	8.5	8.4
Spain	4.2	6.3	9.3	11.7	11.9	12.0	12.2	12.4	13.2	13.4
Sweden	4.2	5.9	8.5	14.1	12.5	14.8	15.1	15.1	14.4	13.8
Switzerland	4.7	5.6	8.6	9.5	10.3	10.4	10.4	10.7	11.0	12.4
Turkey	0.6	0.8	1.5	2.5	2.2	3.3	3.9	4.1	4.6	4.6
United Kingdom	4.7	5.1	6.2	5.8	6.8	6.3	6.2	6.2	6.4	6.0
United States	4.2	5.6	7.1	7.7	8.4	8.7	8.7	8.8	8.8	8.7
<i>Unweighted average:</i>										
OECD Total	4.9	5.8	7.6	8.4	9.0	9.2	9.3	9.7	9.9	10.2
OECD Europe	5.7	6.7	8.7	9.7	10.3	10.5	10.6	11.0	11.2	11.6
EC	6.8	7.8	9.8	10.6	11.6	11.3	11.2	11.6	11.8	12.4

* See endnote 4.

Source: OECD (1995), *Revenue Statistics of OECD Member Countries 1965-1994*, p. 79.

Table 2
Employees' and Employers' Shares of Social Security
Contributions* as a Percentage of Total Taxation in the G7 Countries, 1993

Country	Employees' Share	Employers' Share	Employers' Total
Canada	5.4	11.0	.67
France	13.6	27.3	.67
Germany	16.9	19.7	.54
Italy	6.0	27.4	.82
Japan	12.7	17.4	.58
United Kingdom	6.6	10.5	.61
United States	11.5	16.5	.59

* See endnote 4.

Source: Derived from OECD (1995), *Revenue Statistics of OECD Member Countries 1965-1994*, pp. 80-81.

Future of Payroll Taxes in Canada

Substantial future increases in Q/CPP contributions are predicted to maintain the current plan. These projections assume that benefit levels and eligibility requirements will remain the same, which may not be realistic. Nonetheless, a decrease in Q/CPP contribution rates seems unlikely.

The UI premium rate was set annually using a statutory rate as a benchmark, which is determined based on a three-year average of program costs. Changes to UI financing arrangements in 1990 eliminated any general revenue contributions to the program, leaving it fully funded through employee and employer contributions. During the 1980s, general revenues made up about 25 percent of the total UI fund. Although this change has tended to put upward pressure on premium rates, modifications to eligibility requirements and benefit reductions during the 1990s may present opportunities for further payroll tax reductions.¹¹

On December 1, 1995, the then Minister of Human Resources Development Canada, Lloyd Axworthy, unveiled the new "Employment" Insurance (EI) plan. The objective of EI is to promote an environment which encourages job creation. Savings of \$2 billion annually are expected when the new Employment Insurance program is fully implemented in 2001-2002. Of this \$2 billion, \$800 million annually will be added to the current \$1.9 billion budget for investment in job creation initiatives.¹² Savings will also be directed toward building the UI/EI surplus to above \$5 billion through to the end of 1996 (as outlined in the 1995 federal budget¹³) to stabilize premium levels so the fund can support increased demands during downturns in the business cycle without increasing premium rates during those periods. Premiums, under the new EI system, are to be set to cover the cost of the program and to maintain relatively stable rate levels over the business cycle.

Business View of Payroll Taxes

Effectively, employer payroll taxes constitute an indirect tax on labour. There is contention among various stakeholders regarding how employers react to payroll taxes. Business argues that employer payroll taxes discourage job creation, primarily for small business, which is the fastest growing employment sector.¹⁴ The business community, led by the Canadian Federation of Independent Business (CFIB) and the Canadian Chamber of Commerce, is lobbying the government to pass any savings realized through the current UI reform, beyond that which is required to build the surplus to \$5 billion, directly on to business in the form of further payroll tax cuts.

Surveys conducted by the CFIB (1996) and the Canadian Chamber of Commerce (1994) indicated that among small and medium-sized businesses, lower payroll tax rates were ranked as the most important component of job creation.¹⁵ As part of its study of job creation by small and medium-sized business in Canada, entitled “On Hire Ground,” a survey of CFIB members indicated that just over 50 percent of respondents would hire if payroll taxes were reduced. The Chamber of Commerce survey, in its Aim for a Million report, indicated that payroll taxes ranked second among respondents, overall, in terms of issues to which the government should give top priority in order to promote sustainable business and employment creation. Only debt/deficit reduction ranked higher. UI and Workers’ Compensation were believed to be the payroll taxes which most discouraged employment creation, across all business sizes. As a result, the Chamber of Commerce report recommended that employee UI premiums eventually be reduced to \$1.57 per \$100 of insurable earnings and the employer levy be reduced to \$2.20 per employee. To accelerate job creation, the report suggested a one-year payroll tax holiday for small businesses for each additional full-time employee hired.¹⁶ Another survey, conducted on behalf of the Alliance des manufacturiers et des exportateurs du Québec (1996), indicated that 52 percent of respondents believed that reducing payroll taxes would create employment.

Business argues that the \$800 million earmarked for new training and employment schemes will not be well spent, given the past history of government job creation programs. “With \$2.5 billion already being spent on training and related services, and the auditor general questioning the efficacy of existing program assessments, there is a case to be made for making sure existing programs are working.”¹⁷

The position of the Canadian Labour Congress (CLC) is that an important distinction must be made between the impact on job creation of increases versus levels of payroll taxes. Tax increases have a potentially significant impact on jobs if they are unanticipated when wage and salary levels are negotiated, while the level of taxes will have a limited effect at the low end of the wage and salary scale. This suggests that the key issue is not the absolute level of payroll taxes, but managing changes in such taxes so they are anticipated. The CLC supports, in principle, the federal government’s proposal to build a surplus in the UI fund so premiums remain stable throughout the business cycle. The CLC has never supported the use of UI money for job training programs.¹⁸

Economists' View of Payroll Taxes

From the perspective of economists, the effect of payroll taxes on job creation depends on who bears the burden of the tax. Economists analyze the burden of a tax based on the responsiveness of the market to the imposition of the tax. Much of the economic literature suggests that employer payroll taxes are passed back to labour in the form of lower wages. Therefore, the level of employment remains unaffected, at least in the long term. Another important aspect, from the viewpoint of economists, is that the long-term effect of an increase in payroll taxes will be identical, regardless of whether the tax is initially levied on the employee or the employer.

In the short term, the business and economic views may converge, as there will be an adjustment time lag between the imposition of the tax and the market's response. Di Matteo and Shannon have suggested that employment effects per se may not really be a concern of business at all, but merely a popular means of generating support for reducing a tax which lowers producer surplus and increases administrative expense.¹⁹

Government View of Payroll Taxes

Agenda: Jobs and Growth is a series of four reports published by the federal government in late 1994 that addresses four key components of the government's jobs and growth agenda: reforming social security, ensuring a healthy fiscal climate, reviewing government programs and priorities, and strengthening the performance of the Canadian economy in investment, innovation and trade. The reports were prepared by Human Resources Development Canada, the Department of Finance Canada and Industry Canada. Each department makes reference to payroll taxes and their effect on job creation.

Human Resources Development Canada's contribution to the series, *Improving Social Security in Canada*, also asserts that payroll taxes are a drag on employment.²⁰

The Department of Finance Canada, in its report *A New Framework for Economic Policy*, stated that the initial impact of a higher payroll tax is to raise the effective wage cost to the employer, usually with no offsetting benefit.²¹ This, in turn, diminishes the incentive to create new jobs and raises the unemployment rate, other things being equal.

Industry Canada's contribution to the Agenda: Jobs and Growth series, *Building a More Innovative Economy*, stated that payroll taxes raise the relative cost of labour, creating a disincentive for firms to create jobs. Additionally, because payroll taxes are not profit-based, they put undue pressure on firms during cyclical down turns.²²

Ontario Fair Tax Commission Recommendations

The Ontario Fair Tax Commission was established by then finance minister, Floyd Laughren, in March 1991. Its mandate was to review the tax system in Ontario and to make recommendations for enhancing the system's fairness. The Commission was made up of representatives from academia, business and labour unions.

In December 1993, the Commission released its final report. Its recommendations included a rejection of increased reliance on payroll taxes in Ontario. Despite the many advantages of payroll taxes as a source of revenue, including the relatively low level of payroll taxes in Canada when compared internationally, the immobility of employment and consumption income, and the large tax base, the Commission concluded that the existence of any evidence that payroll taxes may have adverse employment effects makes increased reliance on payroll taxes undesirable.

PART 2: AN ECONOMIC PRIMER

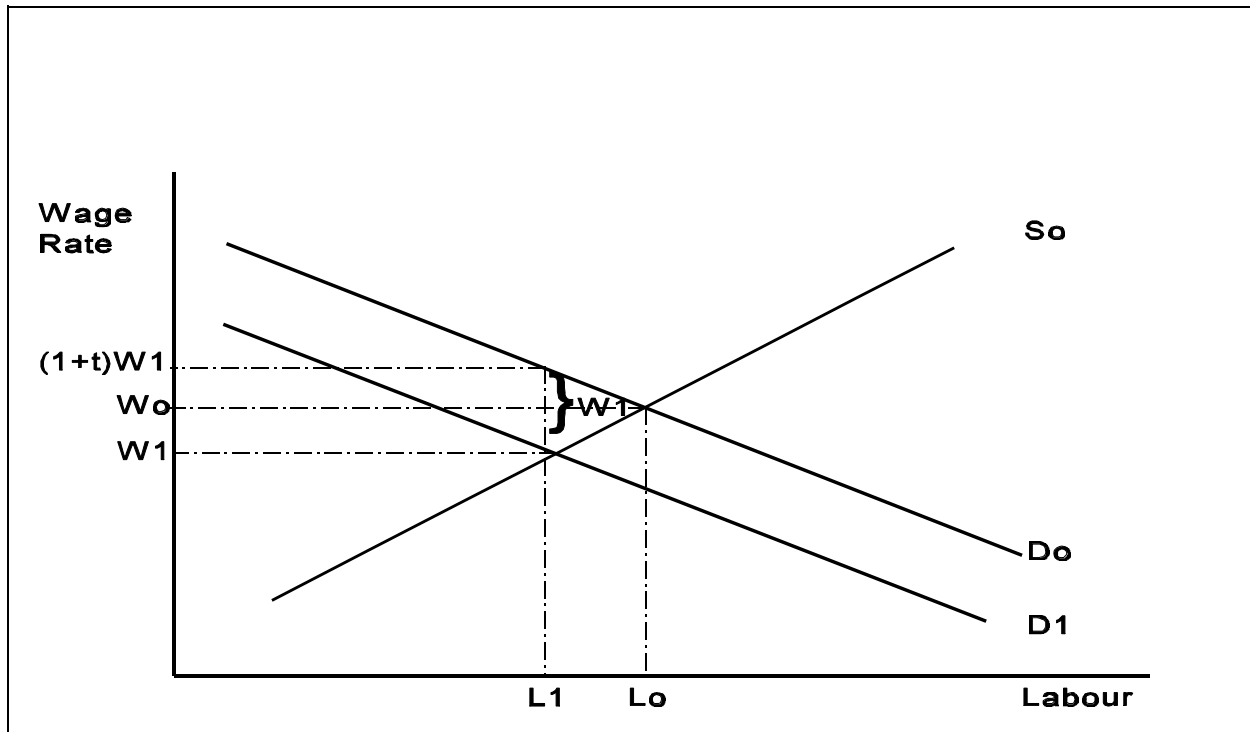
This part of the paper provides a brief primer of the theoretical underpinnings of the labour market and familiarizes the reader with some of the terminology used throughout the remainder of the paper.

The Competitive Labour Market Model

Under the competitive labour market model, an increase in employer payroll taxes increases the cost of labour, and in turn, the demand for labour falls. This process causes market-clearing wage rates to fall, which partially offsets the payroll tax levy. Alternatively, an increase in employee payroll taxes reduces the proceeds from work and thus, lowers the supply of labour, thereby increasing the tax-inclusive wage rate to offset the tax. In either situation, tax-exclusive wage rates and employment levels fall. Labour and capital share the burden of the payroll tax. (See graphs 1 and 2)

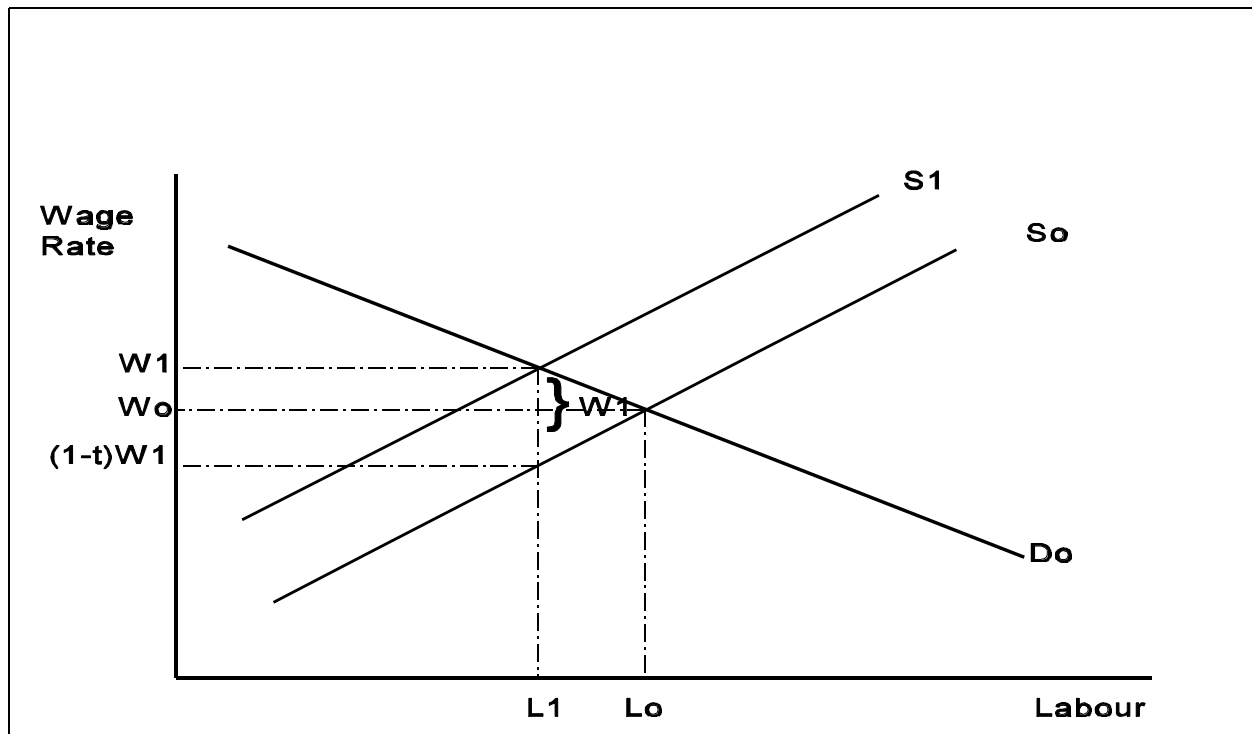
The portion of the tax burden borne by each depends on the relative elasticities of labour supply and demand. The less elastic the supply of labour and the more elastic the demand for labour, the greater the share of the burden labour will bear. Conversely, the more elastic the supply of labour and the less elastic the demand for labour, the greater the share borne by capital. Therefore, labour supply and demand elasticities are the parameters which ultimately determine the change in employment due to a change in payroll taxes.

Graph 1
The Competitive Labour Market Model: An Increase in Employer Payroll Taxes



A payroll tax levy (t) causes the original demand curve (D_0) to shift downward along the labour supply curve (S_0) to D_1 . The gap between D_0 and D_1 is equal to the payroll tax per unit of labour. At the original wage rate (W_0), labour demand would fall. However, in the case of a perfectly competitive labour market, the surplus of labour would cause the wage rate to fall to W_1 until the surplus was eliminated. Therefore, part of the burden of the payroll tax is borne by labour in the form of lower wages (W_1) and reduced employment, and part is borne by capital because the cost of a unit of labour has increased to $(1+t)W_1$.

Graph 2
The Competitive Labour Market Model: An Increase in Employee Payroll Taxes



A payroll tax levy (t) causes S_0 to shift backward to S_1 , as there is less return to working. In a competitive labour market model, the excess demand for labour would cause the market wage rate to increase to W_1 . Part of the employee payroll tax burden is borne by labour in the form of a reduced wage, $(1-t)W_1$. Part of the burden is borne by capital as the cost of labour increases to W_1 .

The characteristics of a perfectly competitive labour market are a completely mobile work force, standardized labour (i.e., all workers in a particular industry are equally productive) and the inability of either buyers or sellers of labour to influence the wage rate (i.e., no monopolies, no strong union representation). Furthermore, wage rates adjust in response to market conditions to clear the labour market so the supply of labour is always equated with the demand for labour. Employment falls but no involuntary unemployment occurs as fewer workers are willing to work at the lower equilibrium wage rate (i.e., labour supply is withdrawn from the market).

Obviously, the competitive labour market model adopts assumptions that are not always representative of the real world. For instance, in Canada, approximately 35 percent of workers are covered by collective agreements and, therefore, the competitive labour model does not always accurately reflect the determination of wages.²³ Furthermore, all provinces in Canada have legislated minimum wage rates which distort the functioning of the labour market.

Additionally, the competitive labour market model reflects a static partial equilibrium analysis and, therefore, ignores other shocks which can affect the labour market, particularly

changes in output prices. When this analysis is extended to consider the general equilibrium implications of a payroll tax increase, the cost of labour rises, thereby increasing production costs and, in turn, raising the general price level. Consequently, capital faces increased production costs, and the original relative cost differences between labour and capital are restored. Therefore, no substitution of inputs to the production process would occur, eliminating any employment disincentives in the long run.

Nonetheless, the competitive labour market model provides a generally accepted economic framework from which to conduct labour market analysis. Most of the empirical analyses of payroll taxes have been based on this model.

Efficiency Wage Models

An alternative model which challenges the underlying assumptions of the competitive labour market model, particularly the assumption that real wages adjust to clear the labour market and eliminate all involuntary unemployment, is the efficiency wage model.²⁴ While there are several variants to this model, they share the notion that a firm's production costs are reduced if it pays a wage in excess of the market-clearing wage, because labour productivity will be higher. Therefore, there is involuntary unemployment in equilibrium.

One of the best-known versions of the efficiency wage model is that of Shapiro and Stiglitz (See Graph 3), which offers a rationale for efficiency-wage-generated unemployment. In the simplest model, as with the perfectly competitive model, labour is standardized and all firms are the same and, therefore, will pay the same wage in equilibrium.

Basically, firms may decide not to cut wages in the face of involuntary unemployment in order to increase the cost of shirking and, consequently, job loss; to reduce employee turnover; to attract quality applicants; and to bolster employee morale.

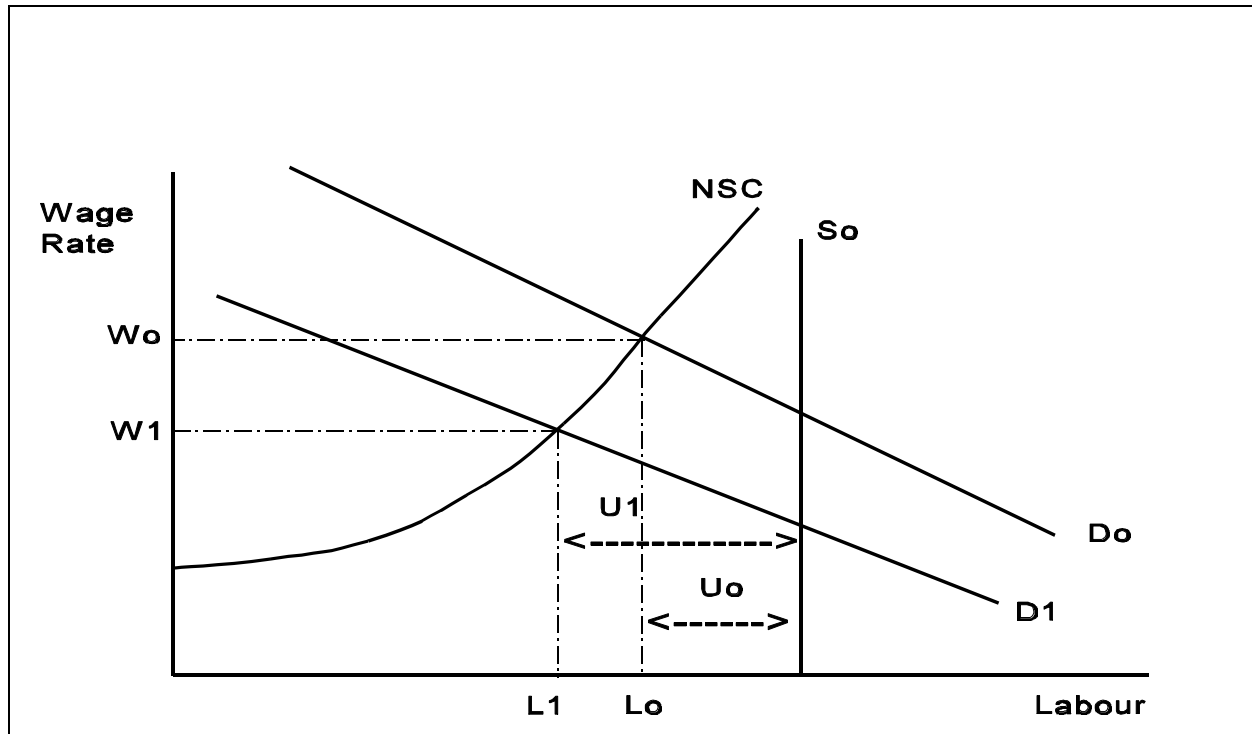
The basic presumption behind efficiency wage models is incomplete information. Businesses are unable to monitor employee productivity effectively and, therefore, will pay higher than market-clearing wages. As a result, firms may not decrease their real wage rate in response to an increase in payroll taxes. Since the wage rate will not clear the market, some unemployment will be generated. Hence, the efficiency wage model can explain involuntary unemployment and also, the persistence of unemployment.

Tax Incidence

Tax incidence refers to the extent to which the tax burden is shifted back onto the inputs of production (i.e., capital, labour) or forward onto the outputs of production (i.e., goods) once markets have adjusted to a tax shock. Ultimately, taxes are always borne by people, not institutions, whether in the form of higher prices, lower wages or lower returns to shareholders.

Graph 3 Efficiency Wage Model

Assumptions: The firm pays more than the market-clearing wage rate to provide an incentive not to shirk. Labour supply is completely inelastic.



The no shirk constraint (NSC) represents the combination of the wage rate and the level of employment at which employees will have an incentive not to shirk. The horizontal distance between the NSC and the labour supply curve (S_0) is the level of unemployment. S_0 lies to the right of the NSC as the wage cannot clear both the market for worker effort and the market for those who want to work simultaneously. The efficiency wage is always high enough to generate some unemployment. The level of unemployment and the NSC are negatively related so the no shirk wage rate increases as unemployment levels fall. The equilibrium wage rate and employment level are determined where the labour demand curve intersects NSC.

An employer payroll tax increase shifts the labour demand curve from D_0 to D_1 . The wage rate declines from W_0 to W_1 , employment to L_1 and unemployment increases to U_1 .

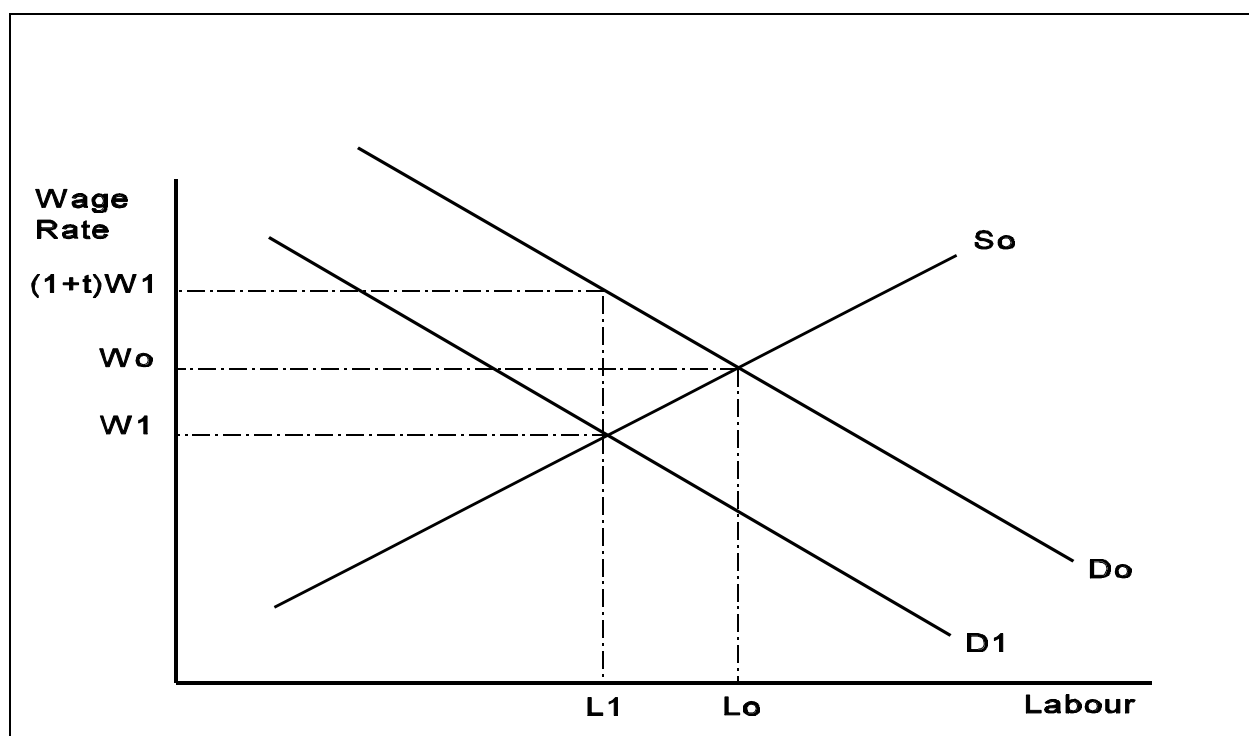
Source: Bev Dahlby (1993), "Payroll Taxes," p. 112.

As Bev Dahlby points out, the incidence of a tax depends on a number of factors:

- long-term versus short-term impacts of labour demand and supply elasticities (See graphs 4, 5 and 6);
- the relative market positions of labour and employers (i.e., strong union representation or monopoly power can affect tax shifting);
- whether the tax base is broad or narrow (i.e., when effective tax rates differ across industries, the more intensively used input, labour or capital, in the higher taxed industries will tend to bear the burden of the tax); and
- the government's budget constraint (i.e., whether the tax increase is being used to replace another tax or to finance spending increases or to reduce a deficit, which can alter the demand or supply of labour).²⁵

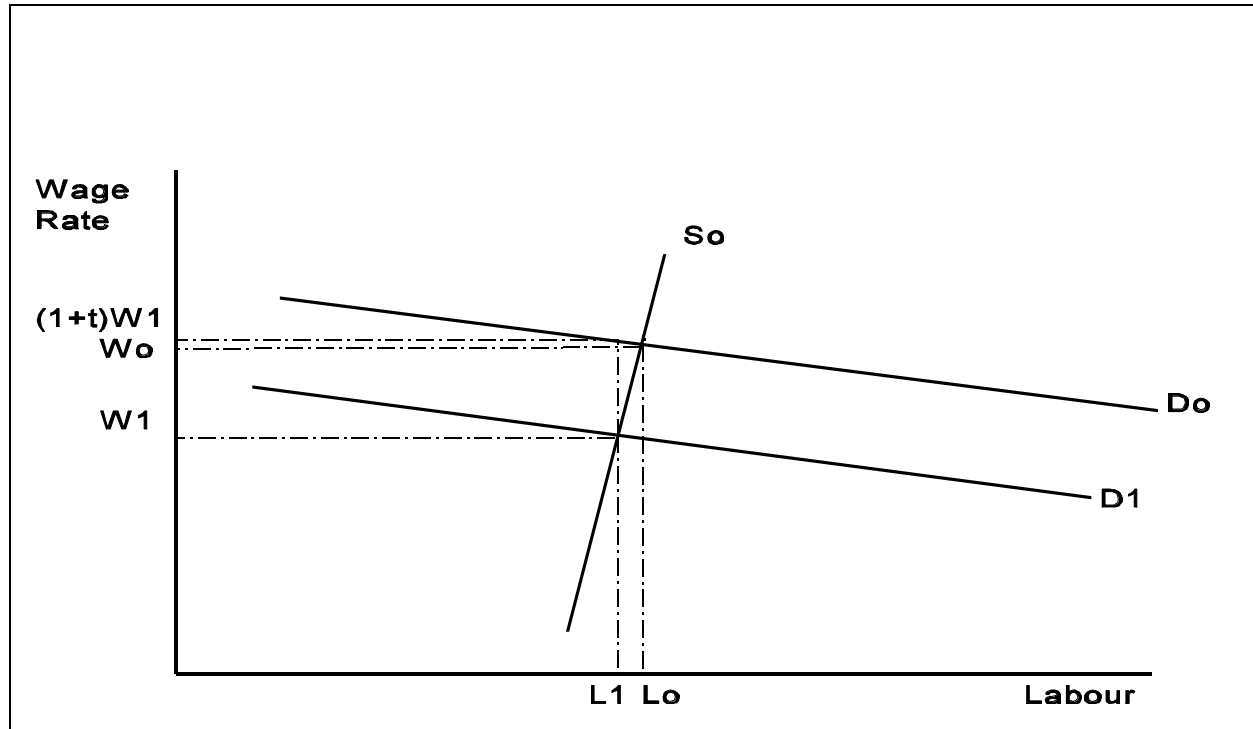
The generally accepted view of tax incidence is that in a small, open economy, such as Canada, tax incidence tends to fall on labour or consumers. This occurs because capital is globally mobile and, therefore, the rate of return to capital is set internationally.

Graph 4
The Effect of Various Elasticities on Tax Incidence: Relatively Inelastic Demand and Relatively Elastic Supply of Labour



An increase in the employer payroll tax will be borne mostly by employers.

Graph 5
The Effect of Various Elasticities on Tax Incidence: Relatively Elastic Demand and Relatively Inelastic Supply of Labour



An increase in the employer payroll tax will be borne almost entirely by workers.

Tax Wedge

The tax wedge refers to the difference between the gross wage costs of labour to employers and the net wage return from work to employees. All types of taxes that intermediate between the gross wage costs of labour and the net earnings of the employee may affect employment decisions from both the labour supply and labour demand side. Three major components affect the magnitude of the wedge: payroll taxes paid by employers, payroll taxes and personal income taxes paid by employees, and value-added and/or retail sales taxes. As well as increases in payroll taxes, personal income and consumption tax increases can also have adverse employment effects in the short run.

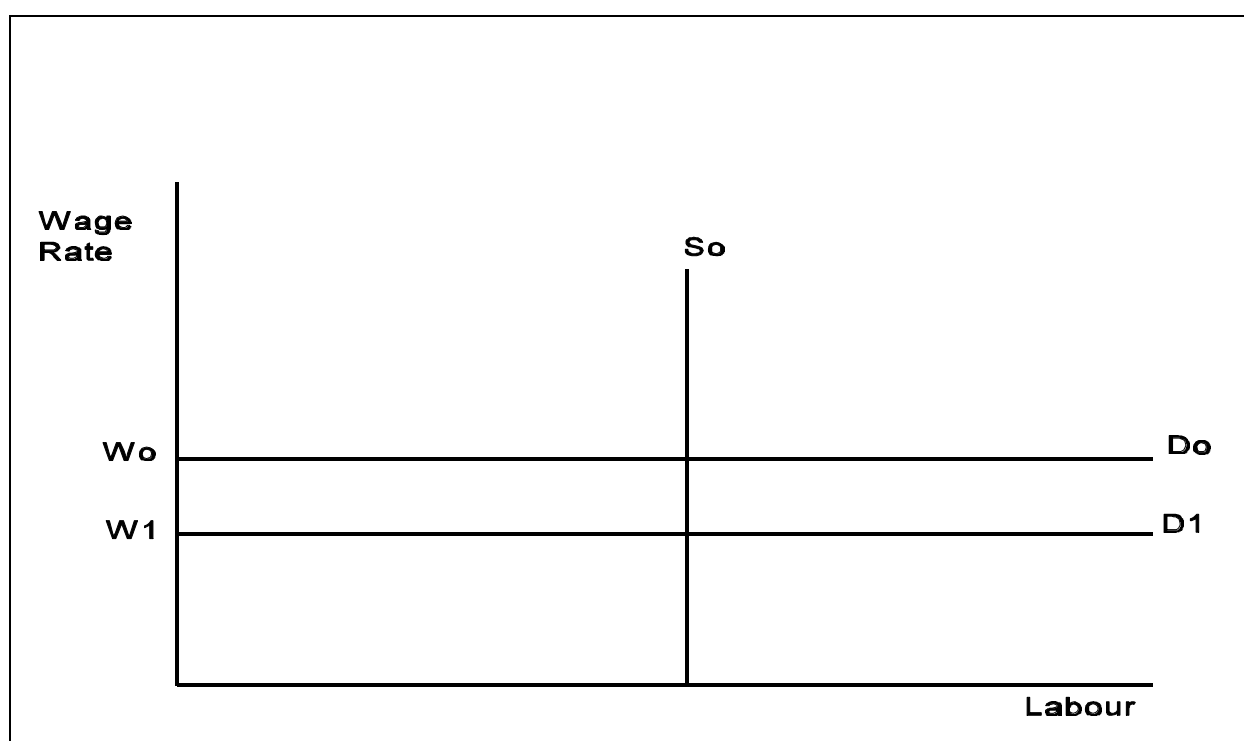
Effects of Earnings Thresholds and Ceilings

Earnings thresholds and ceilings exist for both UI and Q/CPP. Thresholds represent a level of employment earnings, below which no contributions are required and no benefits are payable. Conversely, ceilings refer to the maximum earnings on which premiums are payable and, likewise, the maximum amount on which benefits are paid.

Workers whose incomes are below the minimum threshold are not subject to payroll taxes, nor are their employers. Therefore, changes in payroll tax rates have no effect on such workers. Ceilings, however, affect the marginal tax rates faced by employees whose earnings fall between the threshold and the ceiling (i.e., the marginal employer tax rate for UI and Q/CPP premiums for an extra hour worked is zero for those workers whose income is above both ceilings) and by their employers.

Graph 6
The Effect of Various Elasticities on Tax Incidence Perfectly Elastic Demand and Perfectly Inelastic Supply of Labour

Workers bear the entire cost of an increase in the employers' payroll tax.



In fact, ceilings cause higher wage labour to be relatively cheaper at the margin with respect to payroll taxes. Hence, it is the low-wage sectors which face the highest marginal payroll tax rates. Consequently, wage and employment effects are more severe for lower wage workers when payroll taxes are increased. The effect of ceilings can, therefore, create a bias in favour of hiring highly paid workers. It also creates an incentive to have current employees work more hours as opposed to hiring new employees.

As a consequence of the maximum earnings ceilings on contributions and benefits, high wage workers are relatively unaffected by any payroll tax increases. Workers whose earnings are below the ceiling, however, are likely to experience wage or employment losses associated with any increases in payroll taxes. This concept is discussed further in this paper.

PART 3: REVIEW OF PREVIOUS ECONOMIC LITERATURE SURVEYS

The purpose of parts 3 and 4 is to review the economic literature which addresses the employment effects of payroll taxation. The quantity of research in this area is not substantial. However, academic interest in payroll taxation and its effects on employment has grown in the 1990s, motivated by the search for explanations of, and solutions to, chronic unemployment problems in industrialized nations. Considerable debate exists over whether or not the effect of payroll taxes is to reduce wages or lower employment levels (or both) over the long term.

Part 3 briefly reviews the conclusions of the recent economic literature surveys conducted by Bev Dahlby for the Ontario Fair Tax Commission (1993) and the Canadian Tax Foundation (Dahlby, [1992]), Daniel Hamermesh (1993) of Michigan State University and the OECD (1995) Jobs Study publications.

Part 4 outlines the economic literature on the employment effects of payroll taxation which has emerged since the surveys in Part 3 were completed.²⁶

Bev Dahlby (The Ontario Fair Tax Commission)

One of the contributions to the Ontario Fair Tax Commission report was a historical survey of the economic literature relating to payroll taxation by Bev Dahlby of the University of Alberta. While the primary purpose of Dahlby's survey was to assess Ontario's Employer Health Tax (EHT) levy, the material he examined and his conclusions are broadly applicable to the study of payroll taxes, in general.

Dahlby surveyed the literature in accordance with the two types of economic analyses: theoretical modelling and econometric analysis.

Theoretical Model

As noted in the Part 2, the competitive labour market model predicts that labour and capital will share the burden of a payroll tax increase. The proportion borne by each will depend on the relative elasticities of labour supply and labour demand.

In surveying the literature on the aggregate elasticity of labour supply, Dahlby concluded that according to the empirical evidence, the labour supply of individuals is very inelastic.²⁷ Based on these studies in aggregate, Dahlby determined that a reasonable estimate of the elasticity of labour supply in Ontario is in the range of -0.10 to 0.10. A negative value implies that the labour supply curve may actually have a negative slope, indicating that the income effect of a wage increase will dominate the substitution effect. This suggests that the income effect of higher wages will make most workers want to work less. Such a result can occur because the demand for goods, including leisure, increases with a higher income level.

Assuming that output varies with changes in the wage rate, Dahlby concluded that a reasonable range for the elasticity of labour demand in Ontario is -1.35 to -4.50.²⁸ Given the small

open economy of Ontario, and Canada as a whole, the elasticity of the demand for labour is, not surprisingly, highly elastic.

Given these aggregate elasticities of demand and supply, Dahlby's analysis using the competitive labour market model predicts that labour in Ontario bears 90 percent of the EHT.

Dahlby qualified this conclusion with four caveats that would result in labour bearing less of the payroll tax burden: non-competitive labour markets, adjustment time lags, varying effective tax rates across industries and efficiency wage theories.²⁹ It should be noted that efficiency wage models still support the thesis that labour bears most of the burden of an increased payroll tax, but capital will tend to bear some of the burden even in the case of a completely inelastic labour supply.

Econometric Studies

Dahlby categorized the econometric research according to four basic model types: labour demand models, labour supply models, Keynesian and Phillips curve models, and wage bargaining models.

The earliest analyses of the incidence of payroll taxes used single equation labour demand models.³⁰ These models demonstrated mixed results (See Table 3). Critics of labour demand models claimed that an accurate assessment of the incidence of payroll taxes required the use of a multi-equation model in order to capture the labour supply effects, as well.³¹

Consequently, labour demand and supply models emerged.³² These models suggested that a relatively small part of the tax burden was shifted back to labour. However, these studies also exhibited a number of technical limitations: output was generally assumed to remain constant after the imposition of a payroll tax, the possibility of shifting the tax back to labour through increased prices on output was ignored, and time lags were not always accounted for.

A number of studies based on macroeconomic models emerged in response to these deficiencies. The earliest empirical work was based on Keynesian and Phillips curve models.³³ While these models attempted to provide a more representational view of the wage adjustment process, they proved to be void of a strong theoretical framework.

Table 3
Econometric Studies of Payroll Tax Shifting

Author	Data Set	Conclusions
Brittain (1971)	UN data on the manufacturing sector in 64 countries in 1958	"...the entire employer tax is shifted to labour."
Brittain (1972)	27 US two-digit industries, 1947-65	"...neither the individual industry picture nor the outcome based on pooling offers a resounding endorsement of the full-shifting hypothesis."
Vroman (1974)	Same as Brittain (1971)	Zero shifting and full shifting are both consistent with the data.
Vroman (1974)	OECD data for 19 countries for 1958, 1961, 1964 and 1967	"...employer payroll taxes do not reduce capital's relative share in total income."
Leuthold (1975)	US private non-farm business sector, 1948(I)-1965(II)	"...the hypothesis that labour bears the full burden of the payroll tax in the U.S. must be rejected."
Beach and Balfour (1983)	UK manufacturing 1956(I)-1978(II)	"...the proportion that is actually shifted back on to labour is 45-60 per cent for prime aged males and only 14-19 per cent for married women."
<i>Models of Labour Demand and Supply</i>		
Hamermesh (1979)	Data on the earnings of 587 white adult males in the US in 1973	"...at most only one-third of any flat-rate payroll tax increase is shifted by employers onto labour."
Holmlund (1983)	Mining and manufacturing in Sweden, 1951-79	"...only a fraction of postwar payroll tax increases has been directly shifted back onto labor as lower wage increases."
Hughes (1985)	Transportable goods industries in Ireland, 1953(III)-1980(IV)	Only part of the payroll tax is shifted to labour in the short term.
<i>Keynesian and Phillips Curve Models</i>		
Weitenberg (1969)	The Dutch economy	Just over 80 percent of a payroll tax increase is borne by labour in the short term.
Vroman (1974)	US manufacturing sector, 1956(I)-1967(I)	"Probably less than half of the [employer payroll] tax comes out of money wages."
Dye (1985)	US private non-farm sector, 1954-79	Neither zero shifting nor full shifting could be rejected.

(Table 3 cont'd)

Wage Bargaining Models

Author	Data Set	Conclusions
Knoester and van der Windt (1987)	Aggregate data for 10 OECD countries, 1958-81	"...the shifting forward of taxes and social security contributions is an important factor in explaining real-wage growth."
Padoa Schioppa (1990)	The private sector in Italy 1961-84	"...an increase in the [employers'] social security tax rate induces in the long-run a less than proportional decrease in the nominal wage rate, mildly raising the unitary labour cost (by 1/3)"
Vaillancourt and Marceau (1990)	780 collective agreements signed by large firms in Quebec, 1975-84	Increases in a general employer payroll tax reduced the growth rate of wages, whereas an increase in a firm-specific payroll tax increased the growth rate of wages.
Keil and Symons (1990)	The Canadian economy, 1955-85	"...real wages are increased transiently by increases in the tax and import price wedge."
Pissarides (1991)	The Australian economy, 1966(III)-1986(II)	"...firms bear 63 per cent of any [payroll] taxes and workers bear the remaining 37 per cent."

Source: Adapted from Bev Dahlby (1993), "Payroll Taxes," pp. 114-115.

More theoretically sound successors to the Keynesian and Phillips curve models of wage adjustments are the wage bargaining models which assume that wage determination is influenced considerably by the union bargaining process.³⁴ Interestingly, these studies tended to conclude that real wages continued to grow, despite payroll tax increases, during the periods studied. However, Dahlby ascribed the most validity to the two models which imply the highest burdens borne by labour (Keil and Symons and Padoa Schioppa).

Overall, Dahlby concluded that the collective results of the theoretical predictions and the econometric studies implied that over 80 percent of the employer payroll tax burden in Ontario is borne by labour in the long run. Therefore, payroll taxes do not directly inhibit job creation — at least in the long run.

Payroll taxes may, however, have an indirect effect on employment in the long run. Taxes can distort labour market decisions. Dahlby refers to the Keil and Symons model. While the direct effect of a payroll tax increase on wages has only a short-run effect on employment, the short-run increase in unemployment reduces the real wage rate and decreases the size of the labour force. This short-term reduction in the labour force can lead to the "discouraged worker effect" which can have long-term implications on employment.

Dahlby also referred to Coe's 1990 analysis which indicated that increases in employer payroll tax rates in Canada caused the natural rate of unemployment to increase by 1.5 percentage points from 1971 to the late 1970s and by another one percentage point by 1990. Research

performed in other countries also tends to suggest that increasing payroll taxes may have a long-term impact on unemployment.³⁵

Dahlby also acknowledged the special case of small businesses. Given the importance of small business to job creation, Dahlby suggested that payroll taxes might have an impact on employment growth. His analysis of Cleroux, 1990, 1991, showed that payroll taxes represented 37 percent of the tax burden of firms with assets of less than \$1 million, compared to 28 percent for those with assets greater than \$10 million in 1990. Moreover, payroll taxes also comprised a greater percentage of revenue and of total taxation for smaller firms. The greater burden of payroll taxes on small firms was attributed to the fact that small firms tend to be more labour intensive. Consequently, Dahlby suggested that an ad valorem payroll tax, in the case where labour does not bear the entire burden of the tax, necessarily increases the cost of labour for small firms by a greater proportion than for larger firms.

Bev Dahlby (Canadian Tax Foundation)

Much of the literature surveyed in Dahlby's (1992) piece for the Canadian Tax Foundation publication, *Taxation to 2000 and Beyond*, was incorporated into his survey for the Ontario Fair Tax Commission. However, the approach for the Canadian Tax Foundation was somewhat broader as its focus was not on a particular payroll tax such as the EHT. Therefore, it offers insight into aspects of payroll taxation in addition to that presented in the Ontario Fair Tax Commission survey.

As mentioned above, surveys of the literature on labour supply elasticity by Hausman, Killingsworth and Heckman, and Penceval suggest that labour supply is relatively inelastic in industrialized countries. A reasonable value for aggregate labour supply is about 0.2. Dahlby, following Feldstein,³⁶ argued that the appropriate labour demand function is defined within a general equilibrium model in which total output and the return to capital are endogenous. The elasticity of labour demand varies directly with labour's share of the total cost of production, the elasticity of substitution between labour and capital, and the elasticity of the supply of capital to the economy. Assuming that the stock of capital is fixed and that labour costs represent two thirds of the cost of production, Dahlby determined that the general equilibrium elasticity of labour demand is in the range of -1.35 to -4.5, the same range which he used in his survey for the Ontario Fair Tax Commission. Based on these elasticity estimates for labour supply and labour demand, the share of the payroll tax burden borne by labour is between 0.87 and 0.96.

In the general equilibrium model, if the supply of capital to the economy increases with the return to capital, then the demand for labour will become even more elastic. If labour costs compose two thirds of total product costs, the elasticity of the demand for labour will increase (in absolute value) at twice the rate at which the elasticity of the supply of capital increases. Therefore, Dahlby asserted that even a modest response rate in the supply of capital can have a relatively large effect on the general equilibrium elasticity of demand for labour. In the extreme case of a small, open economy facing a perfectly elastic supply of capital, the demand for labour will be perfectly elastic. Consequently, labour will bear the entire payroll tax burden.

As a result, Dahlby concluded that when the econometric evidence on labour supply and demand elasticities is interpreted in the context of a general equilibrium model, labour bears at least two thirds of the payroll tax burden. For Canada, Dahlby asserted that the burden on labour is likely greater than two thirds, not because of the traditional claim that labour supply is inelastic, but because the demand for labour appears to be quite elastic as a result of the openness of the economy to international capital flows.

Dahlby acknowledged a number of factors that could alter the predictions of the static general equilibrium model. First, payroll taxes with ceilings, as is the case with both UI and CPP, tend to have varying effects across different sectors and groups of workers. Hence, it is important to analyze the incidence of payroll taxes at a disaggregated level to account for these differences. A comprehensive assessment would require a multisector analysis.

Second, because payroll tax increases are often earmarked to fund increases in social security programs, a balanced budget incidence analysis, in which the value of the tax increase is equivalent to the value of the benefit enhancement, may be most appropriate. If the benefits are closely related to a worker's payroll tax, there may not be any effect on labour supply. On the other hand, if the benefits are not closely tied to the payroll tax liability, labour supply will be affected. The impact on aggregate labour supply is indeterminate as some workers may receive more in benefits than they pay in taxes while others will not.

Third, non-competitive labour markets can influence the predictions of the model. Payroll taxes can influence wage demands by unions. Therefore, even in the case of perfectly inelastic labour supply, labour may not bear the entire burden of the tax.

Fourth, the static general equilibrium analysis does not account for any dynamic impacts of payroll tax incidence. In reality, the market does not adjust instantaneously. Therefore, the incidence of payroll taxes in the short run may be quite different than that in the long run.

Dahlby's overall conclusions are that while labour may bear less than 50 percent of the employer payroll tax burden in the immediate short run, once prices have adjusted with a fixed supply of capital, labour will bear at least two thirds of any payroll taxes. In the very long run, when the supply of capital is variable, Dahlby expected labour to bear almost the entire payroll tax burden. This conclusion is especially true for a small, open economy such as Canada's.

Hamermesh (Labor Demand)

Hamermesh's objective in initiating a survey of the empirical analysis of labour demand was to provide an intellectual balance to the extensive study of labour supply in the literature.³⁷

Targeted reductions in payroll tax rates have been a major vehicle for governments to stimulate labour demand. If labour supply is inelastic (under the common assumptions that changes in payroll taxes are revenue neutral, government spending remains unchanged and there is full employment), an increase in payroll taxes will have no effect on equilibrium employment and will simply produce an offsetting decrease in the wage rate. In the polar opposite case of infinitely elastic labour supply, a change in payroll tax rates will affect employment levels but will

not affect the equilibrium wage rate. Killingsworth's 1983 survey of the literature on labour supply provided convincing evidence that labour supply is completely inelastic for adult male workers in industrialized countries. For other workers the labour supply elasticity may be slightly positive. Consequently, in the long run most of the burden of a payroll tax increase is borne by workers through decreased wages. This result is consistent with the conventional wisdom and fairly widely held belief that equilibrium employment is unaffected by changes in payroll tax rates over the long run.

Hamermesh surveyed a number of empirical studies of the incidence of payroll taxes and calculated the implied fraction of the payroll tax that is borne by labour through reduced wages. Table 4 shows the studies which Hamermesh surveyed and his calculations of the range of tax shifted to labour. If the value is one, there is complete shifting of the payroll tax onto labour. If the value is zero, no shifting occurs. The labour demand models which use cross-sectional data imply complete backward shifting of payroll tax increases. However, the time-series analyses shows widely divergent ranges of values, none of which imply complete shifting.

The estimates derived from the studies in the lower portion of Table 4 take into account the effects of payroll taxes on equilibrium wages and employment, as well as labour demand. These estimates also vary widely and no consensus parameter emerges. Consequently, Hamermesh's survey of the empirical literature led him to deduce that the lack of consensus regarding the incidence of payroll taxes and its long-run impact on employment, makes it impossible to draw any firm conclusions. Therefore, Hamermesh maintained that economists must choose between the robust estimates of supply and demand elasticities provided by the theoretical model or the mixed conclusions of the empirical evidence. Hamermesh allied himself with the theoretical model and concluded that, while disequilibria certainly exists in the short run, in the long run, most shocks in the labour market dissipate. Consequently, there is little potential for a payroll tax to depress employment in the long run.

Table 4
Studies of the Incidence of the Payroll Tax

Study	Description	Fraction of Tax Shifted to Labour(s)
<i>Studies Based on Demand or Production Relations</i>		
Brittain 1972	CES model, manufacturing, 1957-59; 64 countries	[1.15,1.71]
Vroman 1974a	CES model, economy-wide, 1958-67; 19 OECD countries	[0.93, 1.40]
OECD 1990	CES model, 1974, 1986; 16 OECD countries	[0.95, 1.13]
Leuthold 1975	MP condition, private non-farm business quarterly, 1948-65	[-0.08, -0.02]
Beach and Balfour 1983	MP condition, manufacturing, quarterly, 1956-78; UK	[0.53,0.60]
<i>Studies Based on Reduced-Form Wage Equations</i>		
Weitenberg 1969	Wage rate changes, annual, 1950-66; Netherlands	0.80
Gordon 1972	Hourly earnings changes, quarterly, 1954-70	0
Vroman 1974b	Hourly earnings changes, manufacturing, quarterly, 1956-69	[0.46, 0.76]
Neubig 1981	Wage changes, individual male workers, 1967-78	[0.23, 0.32]
Holmlund 1983	Hourly earnings, males, mining and manufacturing, annual, 1951-79; Sweden	0.35
Dye 1985	Compensation changes, private non-farm, quarterly, 1954-77	[0.60, 1.28]
Ando, Modigliani and Rasche 1972	Compensation changes, private non-farm business, quarterly, 1954-69	-0.44
Hamermesh 1979a	Hourly earnings levels, individual white males, 1967-73	[0, 0.36]
OECD 1990	Changes in real product wage, annual, 1955-86; average of 16 OECD countries	0.38
Cerasani 1990	Computational general equilibrium model, mid-1980s; Australia	0.67

Source: Adapted from Daniel Hamermesh (1993), *Labor Demand*, p. 170.

Hamermesh also surveyed the literature with respect to the speed of labour demand adjustment, particularly studies that focused on the speed of adjustment of labour demand while disregarding the dynamics of demand for other inputs. Table 5 lists the studies which used annual data. Tables 6 and 7 present those studies which used quarterly and monthly data, respectively. The empirical work using annual data suggests that there is a relatively long adjustment lag compared to the typical business cycle in industrialized economies. The median lag is 5.5 quarters. Studies which employed quarterly data find adjustment to be much quicker, with a median lag of 1.4 quarters. In the cases of both annual and quarterly data, the ranges for the parametric values were quite varied. When monthly data were used, the adjustment period was shown to be much more rapid. Most of the adjustment occurred within six months, and the mean of the median lags was 1.2 quarters. Although there were relatively few studies using monthly data, the ranges of parametric values were quite close, leading Hamermesh to conclude that more studies based on monthly data would be useful in contributing to the knowledge of the speed of adjustment of labour demand. Hamermesh acknowledged that nearly all the evidence shows that employment responds more rapidly to output or cost shocks in North America. He surmised that this is likely due to less restrictive laws and penalties relating to the rapid dismissal of workers and a much lower degree of unionization. However, this explanation appears to be much more descriptive of the US situation than that in Canada. In fact, the Canadian studies which Hamermesh included in his survey imply adjustment lags which are closer to those in the European studies. Additionally, Hamermesh determined that labour demand adjustment was slower among higher skilled workers with adjustment being the slowest in the most skilled occupations.

Table 5
Estimates of the Speed of Adjustment of Labour Demand Using Annual Data

Study	Description	Median Lag (Quarters)
Brown and de Cani 1963	Private non-farm worker-hours, 1933-58	10.2
David and van de Klundert 1965	Private worker-hours, 1899-1960	8.5
Smyth and Ireland 1967	Two-digit industries, employment, 1945-63; Australia	2.0
Coen and Hickman 1970	Private worker-hours, 1924-40, 1949-65	1.8
Lucas and Rapping 1970	Aggregate production-worker-hours, 1930-65	5.1
Morrison and Berndt 1981	Manufacturing, 1952-71	1.9
Merrilees 1982	Aggregate, 1957-78; Canada	4.6
Pencavel and Holmlund 1988	Blue collar, manufacturing and mining, 1950-83; Sweden	3.2

(Table 5 cont'd)

Study	Description	Median Lag (Quarters)
Boyer 1990	Aggregate, 1962-90	4.2
McKinnon 1962	Two-digit SIC manufacturing, 1947-58	1.7
Freeman 1975	University faculty, 1920-70	5.8
Stapleton 1989	PhD economists, 1960-85	9.64
Brown and Ashenfelter 1986	Typographers, estimated employment, 1948-65	(2.5, 3.0)
Jones and Pliskin 1989	Firms in printing, footwear and clothing, employment, some beginning in 19th century; UK	26.3
Schaafsma 1978	Manufacturing employment, 1949-72; Canada	12.5
Layard and Nickell 1986	Aggregate, UK; 1954-83	3.2
Andrews 1987	Aggregate, UK; 1950-79	1.75, cycles
Pencavel 1989	Aggregate, 1953-79; UK	1.6
Bean and Turnbull 1988	Coal mines, 1967-83; UK	(10.1, 12.0)
Card 1990c	Union contracts, employment, 1968-83; Canada	explosive
Wadhvani and Wall 1990	Manufacturing firms' employment, 1974-82; UK	2.6
Epstein and Denny 1983	Manufacturing, 1947-76	<u>Output wage</u> 3.0 < 0
Pindyck and Rotemberg 1983	Manufacturing, 1948-71	short
Morrison 1986	Manufacturing, 1949-80	overshooting, or very short
de Regt 1988	Manufacturing employment, 1954-82; Netherlands	3.3
Faini and Schiantarelli 1985a	Five, two-digit industries, employment, 1970-79; southern Italy	6.0

Source: Adapted from Daniel Hamermesh (1993), *Labor Demand*, pp. 254-255.

Table 6
Estimates Of The Speed Of Adjustment Of Labour Demand Using Quarterly Data

Study	Description	Median Lags (Quarters)
Dhrymes 1969	Total private hours, 1948-60	1.0
Chow and Moore 1972	Private worker-hours, 1948-67	1.3
Clark and Freeman 1980	Manufacturing production workers, 1950-76 Employment: Worker-hours:	1.1 0.6
Kollreuter 1980	Manufacturing worker-hours, 1971-77; West Germany	1.5
Rudebusch 1986	Non-farm business worker-hours, 1952-81	1.9
Faini and Schiantarelli 1985b	Aggregate, 1970-80; Italy Employment: Hours:	0.8 1.2
Nadiri 1968	Manufacturing, 1947-64 Employment: Worker-hours:	0.3 0.3
Black and Kelejian 1970	Private non-farm worker-hours, 1948-65	<1
Franz and Konig 1986	Manufacturing, 1964-83; West Germany	1.5
Beach and Balfour 1983	Manufacturing operatives worker-hours, 1956-78; UK	(1.1, 1.4)
Symons 1985	Manufacturing employment, 1961-76; UK	2.4
Layard and Nickell 1986	Aggregate, 1957-83; UK	18
Wadhvani 1987	Manufacturing employment, 1962-1981; UK	4.2
Nickell and Symons 1990	Manufacturing employment, 1962-1984	>3
Hall, Henry, and Pemberton 1990	Aggregate employment, 1966-88; UK	4.6
Card 1986	Seven airlines, maintenance-worker employment, 1969-76	0.8
Sargent 1978	Non-farm employment, 1948-72	11.2

(Table 6 cont'd)

Study	Description	Median Lag (Quarters)
Kennan 1979	Manufacturing, 1947-69 Durables: Non-durables:	3.0 1.9
Nickell 1984	Manufacturing, 1958-74; UK	1.4
Kokkelenberg and Bischoff 1986	Manufacturing production-worker hours, 1959-77	overshooting immediately
Kuh 1965	Manufacturing employment, 1948-60	0.8
Soligo 1966	Private employment, 1947-61	1.0
McCarthy 1972	Manufacturing and mining, 1953-70 Employment: Worker-hours (L=EH):	2.0 0.8
Taylor, Turnovsky, and Wilson 1972	Manufacturing, 1949-69 Straight-time hours: Production worker-hours:	0.9 0.6
Hazledine 1974	Two-digit manufacturing industries, 1964-70; New Zealand	1.4
Ball and St. Cyr 1966	Industries, employment, 1955-64; UK	2.7
Hazledine 1978	Two-digit manufacturing industries, 1964-73; UK Employment: Hours:	2.2 2.5
Chang 1983	Michigan automobile industry, 1962-79 Employment: Hours:	7.1 0.9
Anderson 1992	Retail firms' employment, six states, 1978-84	0.5
Fair 1985	Manufacturing, 1952-82 Employment: Hours:	4.6 2.1
Wren-Lewis 1986	Manufacturing employment, 1963-83, UK; extraneous expectations on output	4.0

Source: Adapted from Daniel Hamermesh (1993), *Labor Demand*, pp. 257-259.

Table 7
Estimates of the Speed of Adjustment of Labour Demand Using Monthly Data

Study	Description	Median Lag (Quarters)
Liu and Hwa 1974	Private worker-hours, 1961-71	0.4
Bernanke 1986	Small manufacturing industries, production-worker employment, 1923-39	0.5
Brunello 1989	Manufacturing, 1973-86; Japan Employment: Worker-hours (L=EH):	0.5 Overshooting immediately
Kennan 1988	Manufacturing production, worker-hours, 1948-71	3.4
Miller 1971	Production workers, small industries, 1947-66 Employment: Worker-hours (L=EH):	0.4 0.4
Fair 1969	Three- and four-digit manufacturing industries, production-worker employment, mainly 1947-65	2.1
Sims 1974	Manufacturing, 1950-71 Employment: Worker-hours (L=EH):	1.4 0.4
Topel 1982	Two-digit manufacturing industries, 1958-75 Employment: Worker-hours (L=EH):	1.4 0.4

Source: Adapted from Daniel Hamermesh (1993), *Labor Demand*, p. 262.

The OECD Jobs Study, Taxation, Employment and Unemployment

Chapters 3 and 4 of *Taxation, Employment and Unemployment* include a survey of the literature with respect to the impact of taxation on labour supply and labour demand.

Labour supply responses to taxation are analyzed in terms of labour supply elasticities. There is no single, representative labour supply elasticity as different individuals exhibit different behavioural responses to changes in taxation.

Consequently, the size of the labour supply responses is subject to debate among empirical economists. The OECD survey looked at labour supply responses in terms of both hours of work and the decision whether to participate in the labour market at all. With respect to hours of work, the responses of prime-aged men were found to be negligible and possibly even negative, as this segment of the work force tends to be employed in occupations where the hours of work are predetermined. Women in full-time employment demonstrated similar behavioural responses. Married women were shown to have the highest labour supply elasticity at about 0.5.

With respect to labour demand studies, the survey focused on wage bargaining models. As a result of the empirical studies surveyed,³⁸ the Jobs Study concluded that, for the most part, significant evidence exists to support the theory that taxes on labour put increased pressure on wages, hence increasing unemployment in the short term. Whether all taxes on labour affect employment equally is debatable. However, the Jobs Study found that employers' payroll taxes usually have a larger effect than other taxes. Employer payroll taxes were never found to have a smaller effect than other taxes.

While the Jobs Study literature survey found that the short-run effects on unemployment were generally less than one year, it drew attention, as Dahlby did, to the notion that short-term unemployment effects can become long-term effects. The Jobs Study referred to the notion of "hysteresis," the loss of skills due to lack of use. This, in turn, can lead to long-term unemployment, even if the initial causes of unemployment are reversed. Hysteresis is not generally addressed in empirical studies which attempt to assess the employment impacts of payroll taxes.

PART 4: SURVEY OF RECENT ECONOMIC LITERATURE

The persistence of structural unemployment experienced by industrialized nations in the 1990s has spawned a number of studies over the last few years which address the issue of payroll taxation and its impact on unemployment. While the research in this area remains relatively sparse, it has been increasing.

A comprehensive examination of all aspects of employment, including the impact of payroll taxes on job creation, was mandated by the OECD member nations in 1992. The OECD Jobs Study is more than a one-time analysis. It is an exercise designed to assess strategies to increase employment levels in its member nations. Its monitoring function is ongoing.

Canada's comparatively severe unemployment problems, among industrialized nations, have also generated some domestic studies of payroll taxation. Empirical studies by Beach, Lin and Picot (1995) and Di Matteo and Shannon (1995) specifically evaluate the employment effects of Canadian payroll taxes on employment levels. Other studies by Wilton and Prescott (1993), Parker (1995) and Cozier and Mang (1993), have examined broader taxation and/or economic issues but have included sections devoted to the analysis of payroll taxation.

The OECD Jobs Study

In response to the chronic unemployment problems of its member countries, the OECD undertook a comprehensive analysis of employment in 1992.

The first stage of the OECD Jobs Study was a two-volume report, entitled *Evidence and Explanations*, published in 1994. Part I of *Evidence and Explanations* examined *Labour Market Trends and the Underlying Forces of Change*, while Part II addressed *The Adjustment Potential of the Labour Market*. This research was followed in 1995 by an evaluation of the progress of the member nations in implementing the recommendations of *Evidence and Explanations*. This part of the study included two separate volumes: *Investment, Productivity and Employment* and *Taxation, Employment and Unemployment*. A number of working papers dealing with more specific employment issues, have been commissioned for the Jobs Study, as well.

Taxation, in general, was covered in the second section of *Evidence and Explanations* and again, in the volume *Taxation, Employment and Unemployment*. The following commentary summarizes the findings and recommendations of these sections, as they pertain to payroll taxation.

The OECD Jobs Study stresses, as Hamermesh (1993) did in his survey, that it is important to recognize that there is no empirical evidence to suggest any simple linkage between the tax burden on labour and unemployment. While, the OECD Jobs Study acknowledged that taxation can affect the level of, and changes in, employment, it also recognized that it is difficult to analyze the effects of taxation in isolation. Other factors, such as the use of tax revenue and its consequent impact on aggregate demand, will also affect employment. In fact, the study alludes to the fact that the high-tax Nordic countries have traditionally experienced low

unemployment levels while Australia, a relatively low tax country, suffers from high unemployment.³⁹

Taxation, Employment and Unemployment, looked specifically at the linkages between taxation and unemployment, with separate chapters on the impact of taxation on labour supply and labour demand. Since it is widely accepted that labour supply, particularly in a small, open economy, is relatively inelastic,⁴⁰ this section concentrates on the findings with respect to labour demand.

Three main themes of labour taxation emerged in the Jobs Study analysis. First, overall taxes on labour, i.e., personal income taxes, payroll taxes and consumption taxes, have increased since 1978. While personal income taxes have tended to fall, payroll and consumption tax increases have more than offset the decline in personal income taxes. Second, in some countries, almost half the cost of employing an average production worker is taxation. In Canada, it is more than one quarter. Third, the tax reforms of the 1980s shifted the distribution of the tax burden. In many countries, average and marginal tax rates on low income workers actually increased. In Canada, while average tax rates increased for all income groups, the increase was greater at lower income levels. Marginal tax rates, on the other hand, increased for low income workers, but decreased for high income workers. An increased reliance on consumption taxes, which are regressive, or at the very least, less progressive than income taxes, further increased the relative tax burden on low income households.

The OECD's analysis showed that despite tax reforms designed to reduce tax burdens in the 1980s, the magnitude of the overall tax wedge actually increased in several countries, including Canada, between 1978 and 1992. In Canada, average combined income and employee payroll taxes have increased by seven to eight percentage points since 1978, over a wide range of income levels and family types.⁴¹ In addition, the level of employer payroll taxes has been increasing in a number of countries, including Canada. The increased reliance on payroll taxes has likely increased the tax wedge more so for low income earners due to the effect of ceilings. Consequently, the Jobs Study concluded that the tax system weighs more heavily on low income earners, in both absolute and relative terms, than it did in the 1970s. Unemployment is, of course, concentrated among those with low skills and low potential earnings.⁴²

Empirical Work

The OECD Jobs Study used two approaches to identify the link between taxation, wages and unemployment: cross-country comparisons and time-series studies within a country.

The cross-country comparisons did not show a significant correlation between taxation and unemployment. However, when the share of wages out of total labour costs is compared to the social security contribution rate of employers, there is a clear negative relationship. Two interpretations can be drawn from this relationship: wages decrease as employers' contributions increase (i.e., labour bears the burden of taxation) or the total amount of labour employed falls as employers' premiums rise (i.e., payroll taxes inhibit job creation). The relationship is not strongly correlated, most likely as a result of adjustment time lags.⁴³

The time-series studies indicate that resistance to wage cuts following from tax increases may be significant in several OECD countries. Although a general consensus exists within the literature that high taxes will raise the cost of labour, the extent of the increase, its impact on employment, the magnitude of the adjustment time lag and whether the impact is symmetrical if the increase occurred as a result of higher premiums on employers, higher premiums on employees or higher consumption taxes, are unclear.

The OECD Jobs Study found that different studies produced different results, even with respect to research for the same country, regarding the impact of taxes on wages and unemployment. Therefore, no conclusive policy implications could be drawn from the empirical evidence. A limitation of many of the empirical studies is that a single proxy is used to represent the effects of the tax system. As the Jobs Study points out, average and marginal tax rates can have different effects. Average tax increases can lead to wage-push pressures, whereas marginal tax increases can increase the unemployment cost of gaining a higher net income and, therefore, may influence union bargaining strategies.

The OECD Jobs Study commissioned its own study to examine the impact of both average and marginal tax changes on labour costs.⁴⁴ Given that rises in unemployment levels in OECD member nations have tended to parallel increases in the price wedge, the primary objective of the analysis was to examine the long-term effects of changes in the price wedge, including various tax rates, on employment. The price wedge comprises employer and employee payroll taxes, consumption and excise taxes, income taxes and relative import prices. If the price wedge is found to have a long-term impact on employment levels, real wage resistance is said to exist and hence, an increase in the wedge will lead to higher unemployment.

Tyrvainen found that Canada demonstrated high wage resistance to changes in the price wedge and, hence, higher labour costs associated with increases in the price wedge. In fact, he could not reject the hypothesis of full long-run wage compensation in Canada. However, what is most interesting is Tyrvainen's finding that the unfavourable impact of real wage resistance in Canada was not due to taxation, but to increasing relative import prices.

“The Employer Payroll Tax in Canada and its Effects on the Demand for Labour” by Charles Beach, Zhengxi Lin and Garnett Picot

This paper provides new data and evidence on the degree of payroll tax shifting in Canada and its effects on the demand for labour. Its analysis focused on the elasticity responses of labour demand in Canada and did not address labour supply.

Beach, Lin and Picot's model used Statistics Canada data on employer tax payments during the 1961 to 1993 period. Payroll taxes were analyzed at a provincial level due to the variation of such levies across the provinces. Employer tax payments included various provincial payroll tax levies such as workers' compensation and health insurance premiums, private pension plan contributions and federal UI and Q/CPP contributions. As legislated tax rates are not comparable because the base varies among different payroll taxes, effective rates were used. Effective tax rates were calculated as total employer tax revenues divided by total wages and salaries.

Beach, Lin and Picot estimated a demand for labour function for employment of workers, and implemented it using pooled cross-provincial/time-series data. Specified annual average employment levels by province served as the dependent variable and regressions were run for the 1966 to 1993 period over 10 provinces.

The main conclusions were that the estimate of long-run labour demand elasticity is about -0.30 and there is a significant downward shift in the demand for labour in response to higher payroll taxes. Beach, Lin and Picot acknowledged, however, that the only other Canadian empirical analysis on payroll tax shifting which had been completed at the time of their analysis, was that by Wilton and Prescott (1993) (reviewed below) which obtained opposite results. Furthermore, the variance in labour demand elasticities throughout the literature was recognized by the authors.

Given the mixed results of the empirical analysis, it is difficult to come up with a definitive conclusion on the impacts of employer payroll taxes on the labour market. However, Beach, Lin and Picot noted that there were some qualitative implications which could be deduced. First, labour supply elasticities for males are typically quite inelastic. Therefore, a payroll tax is much more likely to reduce wages than employment and thus, will not affect employment in the long run. The labour supply elasticity for females, on the other hand, particularly those married with children, is higher and, therefore, the effects on an employer payroll tax are likely divided between lower wages and higher unemployment. Beach, Lin and Picot cited the fact that the fall in real wages for males in Canada since the 1980s, is consistent with the predicted low wage elasticities for men.

Second, tax shifting may be influenced by the perceived benefits associated with a particular type of payroll tax. For instance, because there is a benefit associated with contributions to UI, increases in UI premium rates would be expected to have greater wage loss effects and smaller employment loss effects than increases in premiums for benefits which are received regardless of whether one is employed such as health or education levies. Similarly, because benefits are so far into the future, for most workers, Q/CPP contribution increases would tend to have greater employment effects than those associated with UI premium increases.

Third, global economic integration may lead to output prices becoming more elastic. This, in turn, would lead to a more elastic demand for labour. In the case of a labour supply that is not perfectly inelastic, the downward shift in the demand for labour resulting from a payroll tax increase would result in larger wage losses and larger employment losses, at least in the short run.

Fourth, the ceilings on UI and Q/CPP contributions widen earnings inequality in the market. Earnings of high wage workers would be expected to be relatively unaffected by any payroll tax increases because the marginal cost of a payroll tax increase is zero at incomes above the ceilings. However, workers whose incomes fall below the ceilings are likely to experience wage and/or employment losses with any increases in employers' payroll taxes. Beach, Lin and Picot found a pattern of widening earnings inequality to be consistent with what occurred to the earnings of Canadian males since the early 1980s and Canadian female earnings since the late 1980s.

“Payroll Taxation in Canada: Evidence and Policy Implications” by Livio Di Matteo and Michael Shannon

In their study, Di Matteo and Shannon examined the impact of marginal and average payroll tax rates on levels of wages and employment. Table 8 shows the impact of a one percent increase in marginal payroll tax rates using various labour demand and supply elasticity estimates.

Table 9 presents the estimated long-run effects of a one percent increase in the average payroll tax rate. The top panel represents the impact of a payroll tax increase derived from the model of Bean, Layard and Nickell, 1986. The bottom section of the table shows the impacts derived by Di Matteo and Shannon using their own data. The estimates from the Bean, Layard and Nickell model indicated that a one percent increase in payroll taxes causes a 0.5 percent increase in real wage costs and a 0.2 percent decrease in employment. When employing their own estimates, Di Matteo and Shannon concluded that a one percent increase in average payroll tax rates would increase wage costs by 0.56 percent, resulting in a 0.32 decline in employment. This translates into a loss of 40,600 jobs.

Table 8
Estimated Long-Term Effects of a One Percent Rise in Marginal Payroll Tax Rate
(Various Labour Supply and Demand Scenarios)

	I	II	III	IV	V	VI	VII
Elasticity Assumptions							
Labour Supply	0	0.15	0.15	0.15	0.50	0.50	0.50
Labour Demand	all	-0.15	-0.30	-2.50	-0.15	-0.30	-2.50
Effects of a One Percent Rise in Marginal Payroll Tax Rate							
Employer Wage Costs/Share	0	0.50	0.33	0.06	0.77	0.63	0.17
Worker Wage/Share	-1	-0.50	-0.67	-0.94	-0.23	-0.37	-0.83
Employment	0	-0.08	-0.10	-0.14	-0.12	-0.19	-0.42
Job Loss (000s)	0	9.50	12.70	18.20	14.60	23.90	53.00

Source: Adapted from Di Matteo and Shannon (1995), “Payroll Taxation in Canada: An Overview,” p. 19.

Table 9
Estimated Long-Term Effects of a One Percent Increase in Average Payroll Tax Rate
Bean, Layard and Nickell

Wage Costs	0.5
Employment	-0.2
Job Loss (000s)	25.4

Di Matteo and Shannon

Wage Costs	0.56
Employment	-0.32
Job Loss (000s)	40.6

Source: Adapted from Di Matteo and Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 20.

Di Matteo and Shannon conceded that there exists a wide range of empirical estimates as to the elasticities of labour demand and supply and, consequently, to the magnitude of job losses associated with payroll tax increases. However, their evidence is consistent with the view that payroll tax increases reduce employment. They claim that the continuous upward trend in unemployment since the 1960s, paralleled by a coinciding rise in payroll taxes, is not likely coincidental.

"The Effects of Tax Increases on Wage and Labour Costs" by David Wilton and David Prescott

Wilton and Prescott's study analyzes the decline in Canada's competitive position vis-à-vis the United States during the 1980s. Economic Council of Canada (ECC) estimates suggested that the gap in manufacturing costs between the two countries increased from two percent in 1980 to 40 percent by 1990. According to ECC calculations, growth in Canadian labour compensation accounted for about 60 percent of the gap while slower Canadian productivity growth was responsible for the remaining 40 percent of the gap. Of the portion attributed to the widening wage gap, the ECC estimated that about 66 percent was caused by considerably higher inflation in Canada, and 30 percent was a result of modest growth in wages in Canada combined with a significant fall in real wages in the United States. The remaining three percent was ascribed to increases in payroll taxes in Canada.

Wilton and Prescott analyzed the incidence and wage effects of personal income taxes, including federal employee payroll levies (i.e., UI and Q/CPP contributions), sales taxes and employer payroll taxes for UI, Q/CPP and workers' compensation. This paper highlights their findings with respect to employer payroll tax levies.

The objective of Wilton and Prescott's study was to assess the degree of tax shifting between labour and business, i.e., the ability of labour to negotiate higher wage compensation as a result of increased taxes, and the ability of firms to negotiate lower wage settlements when employer taxes increase. To estimate the value of the share of a tax rate increase absorbed by labour, an econometric analysis of 2,529 private sector wage contracts signed during the period from 1979 to 1992 was performed. A separate analysis of 867 wage contracts which contained a Cost of Living Allowance (COLA) clause was also performed.

Wilton and Prescott's econometric analysis indicated that, in the case of non-COLA contracts, the coefficient for the share of the employer payroll tax burden that falls on employees is actually negative. This result implies that an increase in employer payroll taxes results in *larger* wage increases. In other words, the results suggest that firms are unable to shift any of the payroll tax increase onto labour and, in fact, may even end up paying higher wages when payroll taxes increase. As the notion of increased employer payroll taxes leading to higher wages is not plausible, Wilton and Prescott suggested that the variable representing the change in employers' payroll taxes may be picking up labour's demand for higher wages to offset the increases on the *employee* UI and Q/CPP premiums. (Note that when analyzing the effects of increases in personal income tax and employee payroll taxes, Wilton and Prescott found that labour was unable to shift any of the portion of income tax or employee payroll tax increases onto the employer in terms of increased wages.) However, modifications to the regression analysis to reflect this possibility were unable to support this hypothesis empirically.

Consequently, Wilton and Prescott concluded that, in the case of non-COLA contracts, there is no evidence to suggest either that labour is able to negotiate higher wages to compensate for increases in personal taxes or employee payroll levies, or that employers are able to pass increases in employer payroll taxes onto labour. Therefore, a one percent increase in employer payroll taxes will increase the cost of labour by one percent.

When the 867 wage contracts with COLA clauses were analyzed, the same paradoxical result occurred, i.e., higher employer payroll taxes actually increased wage levels. Despite the fact that this result is not practically possible, Wilton and Prescott concluded that, at the very least, there is no evidence to support the theory that firms are able to offset payroll tax increases by passing the cost back to labour in the form of lower wages.

Similarly, Dahlby, in his literature survey for the Canadian Tax Foundation, noted that the union model analysis of Oswald, 1985, demonstrates a situation where more than 100 percent of the tax may be shifted to business through a wage increase. If the demand for labour is convex, rather than linear, wages may rise by more than the amount of the tax.⁴⁵

In conclusion, Wilton and Prescott claimed that the increase in employer payroll taxes from 3.7 percent of the average wage in 1980 to 6.7 percent in 1991, increased labour costs by three percent. This increase has not been passed back to labour. When this three percent increase in labour costs is combined with a 3.2 percent increase in labour costs which they determined to be attributable to sales tax increases,⁴⁶ Wilton and Prescott estimated that labour costs during the 1980s and early 1990s increased by at least six percent. Moreover, when the effect of price increases of government regulated goods and services by more than market prices,

is added into the analysis, Wilton and Prescott estimated that labour costs increased by another 4.4 percent, bringing the total increase in labour costs to at least 10 percent from the early 1980s to 1991.

Consequently, the results of Wilton and Prescott's analysis imply that increases in employer payroll taxes do increase the cost of labour in Canada and, in turn, reduce employment levels. As the payroll tax increases are not passed back to labour in the form of reduced wages, they contribute to the long-term increase in labour costs in Canada.

“Aspects of Economic Restructuring in Canada, 1989-1994” by Ron Parker

Ron Parker's analysis, published in the *Bank of Canada Review* (Summer 1995), addresses the movement toward a more capital-intensive production process in Canada during the economic restructuring of the early 1990s. Parker identified the principal factors behind this trend in investment and employment: the decline in the cost of computer-based technology, the emergence of a wide gap between the cost of labour and productivity, and the enhancement of productivity as a result of the use of computer-based technology. This survey will concentrate on Parker's analysis of the sharp rise in the gap between labour's cost and its productivity.

The simple model of firm behaviour⁴⁷ implies that producer real wages and the level of labour productivity should move together. In Canada, however, the two began to diverge in 1990, as the producer real wage climbed at a much greater rate than labour productivity. By 1993, the gap had widened to almost five percent from near zero in 1989. By contrast, the gap in the United States has remained relatively small since 1988.

Parker identified three factors which were responsible for the widening of the real wage gap in Canada: a considerable adjustment lag with respect to wage growth, a substantial increase in employer payroll taxes and a fall in world prices for Canadian commodities. Parker contended that it was difficult to quantify the impacts of the adjustment lag and decreasing commodity prices. However, he analyzed the impact of increasing employer payroll taxes.

The producer real wage gap, excluding supplementary labour income (primarily payroll taxes, but including all supplementary benefits paid by employers) was near zero in 1989. However, the ratio of supplementary income to wage and salary income rose by 3.5 percent between 1989 and 1994, from 10.6 percent to 14.1 percent. Further, based on a rudimentary model of the empirical relationship between the production real wage and the level of productivity, as outlined in the simple theory of the firm, Parker estimated that the increase in supplementary labour income paid by employers between 1988 and 1993, reduced the level of employment by about one percent in 1993, *ceteris paribus*. This represents about one half of the estimated impact of the widening producer real wage gap over this period.

“Explaining the Jobless Recovery” by Barry Cozier and Kurt Mang

Similar to the Bank of Canada study, the objective of Cozier and Mang's paper (1993) was to attempt to explain the lagging recovery of employment compared to output. Cozier and Mang regressed employment growth on current and past output growth up to the end of 1989 and

found that movements of output and employment tended to parallel one another, with employment growth lagging behind by about one quarter. When they projected this relationship out dynamically through the recession and recovery of the early 1990s, it was determined that actual employment was about 2.6 percent lower than warranted, by the third quarter of 1993.

Cozier and Mang suggested that excessive real wage growth was responsible for the employment shortfall. Since the 1980s, the growth of labour productivity fell behind the growth in producer real wages (i.e., the growth in nominal wages less the growth in producer prices). Therefore, firms might be substituting capital for labour as a result of the high cost of labour.

Using a simple labour demand model with output, trend productivity or pure restructuring and excessive real wages for the period from 1990 to 1993 as explanatory variables, Cozier and Mang analyzed the jobless recovery phenomenon. The results led to the conclusion that, in the long run, employment is not affected by either restructuring or excessive real wages. However, in the short run, the primary cause of the lagging employment growth is excessively high wages. In fact, Cozier and Mang found that growth in wage costs exceeded warranted wage growth by 3.8 percentage points from the first quarter of 1991 until the third quarter of 1993, translating into the loss of 320,000 jobs.

Moreover, increases in payroll taxes over this period were estimated to have contributed about 1.3 percentage points, or about one third of the total of the excess wage cost growth over the period. Based on Cozier and Mang's model, payroll tax increases were responsible for lowering cumulative employment growth by just under one percentage point, translating into just over 100,000 jobs that were not created as a direct result of increasing payroll taxes.

Table 10
Summary of Results

Dahlby (Ontario Fair Tax Commission)	<ul style="list-style-type: none"> - over 80 percent of the employer payroll tax is borne by labour in the long run - indirect effect — “discouraged worker effect” can have adverse employment effects in the long run
Dahlby (Canadian Tax Foundation)	<ul style="list-style-type: none"> - in the short run, labour will bear less than 50 percent of the employer payroll tax burden - over the long run, labour will bear at least two thirds - in the very long run, particularly in a small open economy, labour will bear almost the entire burden
Hamermesh	<ul style="list-style-type: none"> - any employment effects fully dissipate in the long run
OECD Jobs Study	<ul style="list-style-type: none"> - payroll taxes have only short term effects on employment - hysteresis effect can create permanent long-term employment effects
Tyrvainen (OECD)	<ul style="list-style-type: none"> - the greater the resistance to wage reductions, the greater the negative impact on employment - high wage resistance can have long-term permanent employment effects - Canada demonstrated high real wage resistance, however, this was not due to taxation
Beach, Lin and Picot	<ul style="list-style-type: none"> - estimates of backward shifting factor of employer payroll taxes are positive (i.e., workers bear the burden of payroll taxes through reduced wages with no long-term employment effects)
Di Matteo and Shannon	<ul style="list-style-type: none"> - there are long-term employment reductions associated with employer payroll tax increases
Wilton and Prescott	<ul style="list-style-type: none"> - increases in employer payroll taxes are not shifted back to labour - employer payroll taxes increase labour costs permanently, thereby causing a reduction in employment levels
Parker (Bank of Canada)	<ul style="list-style-type: none"> - increases in employer supplementary benefits, comprised mainly of payroll taxes, have had long-term effects on employment
Cozier and Mang	<ul style="list-style-type: none"> - the primary cause of lagging employment growth is excessively high real wages - employer payroll taxes are responsible for about one third of the excess - in the long run, excessively high real wages will not affect employment levels

PART 5: CONCLUSIONS AND OTHER CONSIDERATIONS

Conclusions

Six general conclusions can be drawn from the economic literature survey on payroll taxation. First, there is a general consensus that increases in payroll taxes have adverse employment effects in the short run. However, there are variations in the definition of the short run. It can be as short as less than one year (OECD Jobs Study) or as long as five years (Tyrvainen). A study by Hamermesh, surveyed by Dahlby in his work for the Canadian Tax Foundation, concluded that under reasonable assumptions, the lags in labour market behaviour can delay the eventual impact for several years and, therefore, the short run burden on capital can persist over a substantial number of years.⁴⁸ In most studies, the short run was not defined at all.

Second, while most of the earlier work surveyed by Dahlby and by Hamermesh is unanimous in implying that any adverse effects on employment fully dissipate over the long run, some of the more recent empirical work suggests that increases in payroll taxes can have persistent long-term effects on employment. Moreover, there is evidence that real wage resistance is relatively strong in Canada (Tyrvainen, and Wilton and Prescott), thereby delaying and potentially hindering the long-run adjustment process.

Third, empirical evidence tends to support the notion that increases in the employers' share of payroll taxes have a greater adverse impact on employment, at least in the short run, than taxes imposed on the employee. Dahlby suggested that nominal wage rigidities may explain this difference. In the case of completely inelastic labour supply where labour bears the entire burden of the payroll tax over the long run, nominal wage rigidity in the short term will initially increase the cost of labour and consequently, reduce employment. However, if the tax is imposed on employees, workers will bear the entire burden in the short run, as well, through a decrease in after-tax wages. Employment levels will be unaffected in this case.⁴⁹

Fourth, there has not been any empirical work which tests the effects of a decrease in payroll taxation. There are reasons to believe that the effects would not be symmetrical. In fact, Kesselman (1995) suggests that reducing employer payroll taxes is likely to yield a smaller boost to employment than the corresponding loss attributed with a comparable increase in employer contributions. This is because there would be less resistance to a wage increase (assuming that the decrease was passed onto workers in the form of higher wages), or to no change at all, than to a wage cut. Therefore, the adjustment process would be much more rapid with a decrease in payroll taxes, yielding only a short-lived stimulus to job creation.⁵⁰

In Dahlby's survey for the Canadian Tax Foundation, he referred to a study by Hamermesh which compared the effects of a payroll tax decrease to a corresponding increase. Hamermesh determined that the response to a payroll tax cut is generally slower than the response to a tax increase because labour supply tends to respond more slowly than labour demand.⁵¹

Fifth, ceilings on maximum contributions make marginal payroll tax rates higher for lower income employees and hence, payroll taxes will have a greater negative employment impact on

these groups of employees. Lower income employees are most likely to be women, young workers, the less educated, workers in the Atlantic provinces, non-unionized workers, those employed by small businesses and workers in retail trade and service industries.^{52, 53} Similarly, increases in employer payroll taxes will tend to discourage the creation of part-time positions and can create a bias toward requiring current workers to work longer hours, as opposed to hiring new employees. Effectively, workers with incomes above the maximum contribution ceiling are unaffected by any premium increases.

Sixth, the impact of payroll taxes may be different in the case of small business. This is because payroll taxes constitute a much larger proportion of total taxes for small firms, small businesses tend to be more labour intensive and smaller firms are more likely to hire more low income employees. Although there has been no empirical work which analyzes the effect of payroll tax increases on employment levels by business size,⁵⁴ small businesses, which are traditionally recognized as the “engines of growth” in terms of employment creation in Canada,⁵⁵ are generally regarded as being more burdened by payroll tax increases, both in terms of cost and administration, than larger firms. Furthermore, the “short term” can be quite long for smaller enterprises with limited cash flows, particularly those in the start-up phases,⁵⁶ making it much more difficult for a small firm to weather difficult economic periods than it is for a larger firm. However, it should be noted that small business employees are unlikely to be unionized, therefore, the entire burden of an employer payroll tax will tend to be passed back on to labour through reduced wages. Additionally, this adjustment is likely to be more rapid than in unionized sectors.

Recent Payroll Tax Policies in Other Jurisdictions

It is interesting to note that modifications to payroll tax systems have recently been made in other countries and the provinces of Ontario and Quebec, to achieve economic policy objectives.

The Australian states have long used differential payroll tax rates to provide economic incentives for businesses to locate in their respective states. Among the incentives provided are reduced employer contributions for small businesses and exemptions of employer contributions for employees who have been unemployed for 12 months. Rate relief for small business is accomplished in one of two ways: a general exemption which applies to all payrolls, relieving all employers of the tax on the exempt amount, or a tapered exemption or deduction which is clawed back for higher payrolls so firms with larger payrolls pay tax on their entire payroll. The clawback reduces the revenues lost from the exemption amount.

As part of a package designed to create incentives to hire unemployed people, the 1994 UK budget introduced measures to lower employer payroll tax premiums for low income earners and a tax holiday for employers who hire individuals that have been unemployed for more than two years. Effective April 1995, employer national insurance contributions were reduced by 0.6 percent for all employers on employees earning less than 205 pounds a week (approximately \$425 Canadian). From April 1996, employers hiring an individual who has been out of work for at least two years will receive a full rebate on national insurance contributions for up to one year.

Belgium has also introduced a package of incentives, the Employment Advantage Plan, designed to stimulate employment. Included in the package is a measure which offers an

employer who hires a previously unemployed person a substantial reduction in social security contributions for two years. An employer receives an exemption for the first year and a 75 percent reduction for the second year for individuals who have been out of work for 24 months or longer. For individuals who have been unemployed for 12 months or longer, an employer receives a 75 percent reduction for the first year and a 50 percent reduction for the second year. This provision applies to both full- and part-time employees. Belgium has also reduced the employer portion of social security contributions for lower paid workers by moving from a linear schedule of social security rates to a degressive rate structure.

Additionally, within Canada, the Ontario government, in its budget of May 6, 1996, introduced a \$400,000 payroll exemption threshold of the Employers Health Tax (EHT). This measure is to be fully phased in by 1999. The new threshold will result in 88 percent of Ontario businesses being exempt from EHT levies.

Also, the Quebec budget of May 8, 1996, extended its three-year tax holiday for new small- and medium-sized businesses to include employers' contributions to the Health Services Fund.

It is also noteworthy that Dahlby, after reviewing social insurance financing in many countries, did not find a compelling economic case for using uniform premiums or payroll tax rates to finance social insurance.

Alternative Design Proposals Discussed in the Literature

Jonathan Kesselman of the University of British Columbia is a proponent of an enhanced tax-benefit link of certain payroll taxes, particularly UI. Kesselman pointed out that UI payroll taxes necessarily have a very loose tax-benefit link as a proportionate payroll tax cannot meet both the social and economic objectives of the expected risk and/or frequency of unemployment as these will vary across sectors and groups of employees. A system of experience rating would require higher risk employees and employers to pay higher premiums, greatly enhancing both the equity and the efficiency of the program. By linking payments to expected benefits, most tax distortions can be eliminated for both employers and employees as the premiums will reflect the expected value of benefits for each worker and effectively act as a price on a privately supplied good. In this case, there would be no disemployment effects of premium increases either as the level of benefits would increase correspondingly.⁵⁷ The Employment Insurance program, introduced by the Minister of Human Resources Development Canada, in December 1995, alludes to a modified experience rating scheme. However, this scheme relates to varying benefit entitlements only and does not address the issue of varying the financing side of the program.

Second, given the regressive effect of payroll taxes due to earnings ceilings, the possibility of restructuring the programs funded through payroll taxes in a way which would redistribute the payroll tax burden more fairly, is commonly suggested.⁵⁸ Of course, this would require consideration of the interaction of many complex issues such as adjustments to maximum insurable earnings/pensionable earnings to reflect differing premiums. As Kesselman noted, the commonly prescribed solution to remove the floors and ceilings for payroll taxes would further weaken the benefit-tax linkage of these programs unless the ceilings on benefit rates were also lifted and the qualification criteria for benefits were reduced.⁵⁹ Additionally, the OECD Jobs

Study cautions that the chosen means of financing any reductions in tax rates on low income earners should have minimal effects on the marginal tax rates of other groups so as not to reverse the effects of recent tax reforms which have lowered marginal tax rates on middle and high income earners.⁶⁰

An alternative to design changes which has been alluded to in the literature is shifting the tax burden away from labour by increasing or introducing other taxes or revenue-raising measures.⁶¹ Tyrvaenen found that shifting the burden to consumption taxes had no adverse employment effects in the short or long term. On the other hand, when Wilton and Prescott looked at the effects of consumption taxes on the cost of labour, they found that employers absorbed three quarters of the increase in consumption taxes when there is a COLA clause, leading to an increase in labour costs. Obviously, shifting the tax burden will raise a number of economic, social and political issues, as well.

In closing, Kesselman made a worthy point in that the use of payroll taxes to fund social security programs should be considered in light of long-term growth and efficiency gains, not in terms of short-term effects of these taxes. This does not mean that the short-term effects should be ignored. As Kesselman suggested, payroll tax increases should occur during times of economic expansion to minimize the negative employment effects which will inevitably occur in the short run. On the other hand, cuts in payroll taxes should occur as the economy declines so the transitory benefits can be used to offset declining employment levels.⁶²

Obviously, any consideration of modifications to the system of payroll taxation will require a comprehensive general equilibrium analysis to assess the overall economic impact of any changes.

ENDNOTES

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1. For 1997, premiums for workers are \$2.90 for every \$100 of insurable earnings. Employer premiums are \$4.06. Maximum insurable earnings are \$39,000 annually or \$750 per week.
2. For 1997, the employee and employer contribution rates are 2.925 percent of earnings for CPP and 3.0 percent of earnings for QPP to a maximum pensionable earnings of \$35,800 and a basic exemption of \$3,500.
3. Livio Di Matteo and Michael Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 5.
4. The Organization for Economic Co-operation and Development (OECD) distinguishes between "social security contributions" and "taxes on payroll and workforce." "Social security contributions" refer to payroll taxes which are used to fund programs in which a link exists between eligibility for benefits and making a contribution. In the case of "taxes on payroll and workforce," there is normally no connection between the receipt of benefits and making contributions. As this paper focuses on federal payroll taxes to fund UI and Q/CPP, which both have benefit–contribution linkages, the term "social security contributions" may be used in OECD publications to refer to these payroll taxes.
5. Bev Dahlby (1993), "Payroll Taxes," p. 96.
6. Charles Beach, Zhengxi Lin and Garnett Picot (1995), "The Employer Payroll Tax in Canada and Its Effects on the Demand for Labour," p. 16.
7. Human Resources Development Canada (1994), "Improving Social Security in Canada," p. 50.
8. Livio Di Matteo and Michael Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 12.
9. Zhengxi Lin, Garnett Picot and Charles Beach (1995), "What has Happened to Payroll Taxes in Canada over the Last Three Decades?" p. 10.
10. *Ibid.*, pp. 87-88.
11. Employee contributions have fallen from \$3.07 per \$100 of insurable earnings in 1994, to \$3 in 1995, \$2.95 in 1996 and \$2.90 in 1997. Similarly, employer contributions have dropped from \$4.30 to \$4.20 to \$4.13 to \$4.06 respectively.
12. Human Resources Development Canada (1995), "News Release," p. 6.
13. *Ibid.*, backgrounder 7, p. 2.
14. Canadian Chamber of Commerce (1994), "Summary of the Key Findings of the Aim for a Million Project and Recommendations for Actions," p. 15.
15. These are the most recent surveys. Previous membership surveys indicated similar concerns regarding payroll taxes.

16. Canadian Chamber of Commerce (1994), "Summary of the Key Findings of the Aim for a Million Project and Recommendations for Actions," p.18.
17. Bernard Wilson (1995), "It's an Uphill Battle to Create New Jobs," p. 19.
18. Peter Cook (1995), "Spend UI Savings Anywhere but Ottawa," p. B2.
19. Livio Di Matteo and Michael Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 15.
20. Human Resources Development Canada (1994), *Improving Social Security in Canada*, p. 42.
21. Department of Finance (1994), *A New Framework for Economic Policy*, p. 21.
22. Industry Canada (1994), *Building a More Innovative Economy*, p. 25.
23. Livio Di Matteo and Michael Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 16.
24. Janet Yellen (1984), "Efficiency Wage Models of Unemployment," pp. 200-205.
25. Bev Dahlby (1993), "Payroll Taxes," pp. 108-113.
26. All articles referred to in parts 3 and 4 contain detailed discussions of the rationale of the precise models used. The original sources should be consulted for more detail.
27. Based on surveys by Hausman, 1985; Pencavel, 1986; and Killingsworth and Heckman, 1986; and Dahlby's survey of Blomquist and Hansson-Brusewitz, 1990; Colombino and del Boca, 1990; Bourguignon and Magnac, 1990; van Soest, Woittiez and Kapteyn, 1990; Triest, 1990; and MaCurdy, Green and Paarsch, 1990.
28. Dahlby derived this range of values based on Hamermesh's constant-output estimates of labour demand elasticity.
29. Bev Dahlby (1993), "Payroll Taxes," pp. 108-113.
30. Dahlby surveyed Brittain, 1971, 1972; Vroman, 1974; Leuthold, 1975; and Beach and Balfour, 1983.
31. Dahlby referred to Feldstein, 1973; "The Incidence of the Social Security Payroll Tax: Comment," *American Economic Review*, 62: pp. 735-738.
32. Based on Dahlby's survey of Hamermesh, 1979; Holmlund, 1983; and Hughes, 1985.
33. Based on Dahlby's survey of Weitenberg, 1969; Vroman, 1974; and Dye, 1985.
34. Dahlby surveyed Knoester and van der Windt, 1987; Padoa Schioppa, 1990; Vaillancourt and Marceau, 1990; Keil and Symons, 1990; and Pissarides, 1991.

35. Dahlby referred to Pissarides, 1991; and Bean, Layard and Nickell, 1986.
36. Dahlby referred to two articles by Martin S. Feldstein: "The Incidence of the Social Security Payroll Tax: Comment," *American Economic Review*, 62: pp. 735-738, and "Tax Incidence in a Growing Economy with Variable Factor Supply," *Quarterly Journal of Economics*, 88: pp. 551-573.
37. Hamermesh referred to the labour supply surveys by Cain and Watts, 1973; and Killingsworth, 1983.
38. The studies surveyed in the OECD Jobs Study are Calmfors and Nymoen, 1990; Bean, Layard and Nickell, 1986; Knoester and Van der Windt, 1987; Newell and Symons, 1985 and 1987; Nickell, 1987; Dolada, Malo de Molina and Zabalza, 1987; Eriksson, Suvanto and Vartia, 1990; Holmlund, 1989; Calmfors and Forslund, 1990; Pichelmann and Wagner, 1986; Layard and Nickell, 1986; Coe, 1990; Andersen and Risager, 1990; Rodseth and Holden, 1990; Hoel and Nymoen, 1988; and Nymoen, 1989.
39. OECD (1994), *Evidence and Explanations, The Adjustment Potential of the Labour Market*, p. 240.
40. See the Ontario Fair Tax Commission (1993), Hamermesh (1993), the OECD (1994, 1995a), all surveyed in Part 3.
41. OECD (1994), *Evidence and Explanations, The Adjustment Potential of the Labour Market*, pp. 241-242.
42. *Ibid.*, p. 243.
43. *Ibid.*, p. 244.
44. Timo Tyrvaenen (1995), "Real Wage Resistance and Unemployment: Multivariate Analysis of Cointegrating Relations in 10 OECD Countries," OECD Jobs Study Working Paper Series No. 10, Paris: OECD.
45. Bev Dahlby (1992), "Taxation and Social Insurance," p. 144.
46. Sales tax increases were found to be shared between employers and employees, with firms absorbing about one quarter of the increase in the Consumer Price Index attributable to sales taxes under non-COLA clauses and three quarters of the increase in contracts with COLA clauses.
47. Firms will continue to add capital to the production process until the extra output generated by the last unit of capital is equal to the cost of capital. Likewise, firms will continue to add labour until the extra output produced by the last unit of labour employed is equal to the cost of labour.
48. Bev Dahlby (1992), "Taxation and Social Insurance," p. 147.

49. *Ibid.*, p. 147.
50. Jonathan R. Kesselman (1995), "Payroll Taxes in the Finance of Social Security," p. 14.
51. Bev Dahlby (1992), "Taxation and Social Insurance," p. 147.
52. Livio Di Matteo and Michael Shannon (1995), "Payroll Taxation in Canada: An Overview," p. 10.
53. Although marginal payroll tax rates are higher for lower income employees, it should be noted that this does not imply that the benefit side of the programs funded through these taxes are regressive. In fact, when the benefit pay-out for lower income workers is set against the contributions/premiums collected from these groups, the programs overall, are progressive.
54. A forthcoming analysis of the employment effects of payroll taxes in the manufacturing sector jointly prepared by Human Resources Development Canada, Statistics Canada and Queen's University, will likely incorporate a breakdown of the sector by size of business.
55. Prompted by recent US studies which suggested that net job creation among small firms may have been overestimated, Picot and Dupuy (1996) undertook a study of employment by business size for Canada. Although they found that in Canada, both gross job gain and job loss, as well as net employment gain are disproportionately located in the small firm sector in both the short and the long run, job gain (and loss) is concentrated among few firms in most class sizes. This is true for both shorter and longer run job gains and losses. Therefore, there are few "typical" firms, of any size, that grow at average rates. Furthermore, there is a tremendous variation in growth within size classes that is obviously related to factors other than size. Moreover, employment growth does not appear to be longitudinal.
56. The research of Picot and Dupuy implies that the exceptional employment growth in small firms is concentrated in firms in the birth stage.
57. *Ibid.*, pp. 5-7.
58. For example, see OECD (1995), *Taxation, Employment and Unemployment*, pp. 85-89.
59. Jonathan Kesselman (1995), "Payroll Taxes in the Finance of Social Security," p. 9.
60. OECD (1995), *Taxation, Employment and Unemployment*, p. 89.
61. For example, see OECD, *Taxation, Employment and Unemployment*, Chapter 4 or Timo Tyrvaenen, "Real Wage Resistance and Unemployment: Multivariate Analysis of Cointegrating Relations in 10 OECD Countries," p. 39.
62. Jonathan Kesselman (1995), "Payroll Taxes in the Finance of Social Security," pp. 14-15.