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INTERNATIONAL MONETARY FUND

CANADA

Selected Issues

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Approved by the Western Hemisphere Department

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EXECUTIVE SUMMARY

The papers presented in this report provide more detailed background information and analysis of selected policy and economic issues in Canada.

The first paper, **Business Taxation in Canada**, reviews Canada's business tax system, looking at the incentive effects of the country's business tax regime and their implications for output and employment. It also presents estimates of marginal effective tax rates on corporate-source income in Canada and comparator countries (the United States and United Kingdom) across sectors, asset classes, means of finance, and asset ownership. The paper finds that Canada compares well with the United States and the United Kingdom. The last major reform of Canada's tax regime in the mid-1980s moved the corporate tax system closer to neutrality by reducing preferences and revising capital consumption allowances more in line with the economic life of assets. Nevertheless, there continues to be scope for improving the neutrality of the system and, thereby, improving resource allocation.

The persistence of unemployment in Canada has been a continuing source of concern, with the country's unemployment rate ratcheting up over successive business cycles during the past 25 years. The second paper, **Labor Markets in Canada**, discusses developments over this period. It notes that unemployment rates in Canada have risen across all demographic groups, industries, and regions, although young and less-educated workers and workers in agriculture and primary industries have been most severely affected. The paper also looks at the roles played by modifications to the unemployment insurance system, changes in unionization, demographic effects, and changes in the cost of labor in accounting for the rise in unemployment. The paper concludes with a discussion of the effects of changes in payroll taxes on employment and unemployment. The empirical estimates presented suggest that, while the effects of a payroll tax increase on employment and unemployment may be largely offset over a six year period, successive increases in payroll taxes, especially during the 1980s, appear to have had a sustained impact on employment and unemployment in Canada.

As in other major industrial countries, demographic and economic changes are putting the finances of Canada's government-sponsored pension system at risk. In response, discussions are underway in Canada on a number of proposals to reform the Canada Pension Plan (CPP). The third paper, **Canada Pension Plan Reform: Analytical Considerations**, describes the main provisions of the CPP and the major reform options under consideration. The paper also examines some of the economic effects of public pension plans in general and simulates the economic effects of changes in a plan's provisions using a stylized dynamic general-equilibrium model of life-cycle behavior. The analysis shows that the introduction of a public pension plan can reduce aggregate saving, income, and wages and increase interest rates. It also shows that a significant part of the distortion caused by such a pension plan can result from the fact that benefits are not explicitly linked to contributions, and that creating such a linkage can reduce the distortions associated with the payroll tax that funds the contributions to a public pension plan.

The fourth paper, **Developments in Productivity Across Industries in Canada**, examines the slowdown in labor productivity and total factor productivity (TFP) growth that has taken place since the mid-1970s. In particular, an assessment is made of the roles in explaining the slowdown of intersectoral shifts of output and labor toward services and other industries with lower productivity growth, a reduction in the benefits from increasing scale in manufacturing, and a slowdown in capital accumulation relative to labor force growth. The paper suggests that intersectoral shifts account for a negligible amount of the slowdown in aggregate labor productivity and TFP growth between 1962–73 and 1974–92, since there has been almost as much of a slowdown in goods-producing industries as in service industries. Reduced benefits from increasing returns to scale and the decline in the growth of the capital/labor ratio account for significant parts of the slowdown; however, a large portion is not explained and may reflect other factors (including relative changes in labor skill levels, in land and natural resource use, and in capital obsolescence) not explicitly considered.

The consumer price index (CPI) is commonly used as a measure of inflation and is often used to adjust tax rates, government spending, and private sector wage contracts for changes in the cost of living. Given its central importance, considerable attention recently has been directed at gauging the accuracy of the CPI in measuring the living costs. The fifth paper, **Measurement Bias in the CPI in Canada**, reviews research in this area and provides a comparison of potential biases in the CPIs for Canada and the United States. By pricing a fixed-weighted basket of goods and services, the CPI is intended to isolate the impact of price changes. However, the use of fixed weights means that the CPI over time may become less representative of the “true” cost of living as individuals respond to price changes and new product choices. The major sources for differences between the CPI and the cost of living (referred to as measurement biases) are: commodity substitution bias, outlet substitution bias, quality bias, and new goods bias. A survey of the research work done on the subject finds that the overall bias in Canada’s CPI inflation rate is estimated to be in the range of 0.5–1.5 percent per year, comparable to estimates for the United States of 0.4–1.6 percent per year.

In recent years, the Bank of Canada has adopted explicit inflation targets and introduced important changes to its operational framework. The sixth paper, **Bank of Canada’s Monetary Policy Operating Framework**, discusses these changes and reviews some of the key issues associated with them. In addition, the paper looks at the impact of the changes in the monetary policy operating framework and their implementation on the public’s assessment of the central bank’s credibility. Surveys of medium-term inflation expectations suggest that it is widely anticipated that the Bank of Canada will maintain low inflation over the next three to ten years. However, longer-term credibility, although difficult to assess precisely, appears to have not yet been as firmly established, judging by the steepness of the slope of the yield curve and the spread between yields on nominal and inflation-indexed government bonds.

The final two papers describe recent developments in Canadian trade policy and in official development assistance.

I. BUSINESS TAXATION IN CANADA¹

A. Introduction

1. During the 1970s and early 1980s, there was an accumulation of business tax preferences in Canada and, as a result, a narrowing of the tax base. This development, and the judgement that statutory tax rates were high, persuaded the Canadian Government to implement a number of reforms to the corporate tax system during the mid-1980s. Canada's examination of corporate tax issues was concurrent with that in other countries, notably the United States and the United Kingdom, who were addressing many of the same issues at that time. In the case of Canada, this exercise culminated in a comprehensive program of tax reform which was initiated 1987. A key consideration in that reform was that the Canadian corporate tax system should be competitive with those of its key trading partners, particularly the United States. By 1989/90 reforms had been implemented that broadened the corporate tax base (in part by reducing capital cost allowances for manufacturing and processing equipment) and reduced statutory tax rates on corporate income. Nevertheless, statutory tax preferences remained for manufacturing and small business.

2. On March 16, 1996, the Canadian government established a Technical Committee on Business Taxation to analyze taxes related to investment and business activity and to recommend changes. The Committee was asked to consider ways of improving the business tax system to promote: (1) job creation; (2) economic growth; (3) simplification and ease of compliance; and (4) fairness. The Committee also was charged with examining the interaction between business taxes—including corporate income, capital, and payroll taxes—and taxes paid by individuals on investment income. The Committee's final report is now scheduled for the end of 1997.

3. This paper reviews Canada's business tax system, with a view to identifying and summarizing tax-based distortions that may induce a misallocation of resources. Section II reviews the existing theoretical tools for evaluating the incentive effects of a country's business tax regime and assesses the general implications for output and employment. Section III describes the salient features of Canada's current business tax regime as of January 1997. Section IV presents and discusses estimates of marginal effective tax rates on corporate-source income in Canada (and comparator countries), across sectors, asset classes, means of finance, and asset ownership. Section V summarizes and concludes that there remains room for reducing tax preferences that distort the allocation of resources in Canada.

¹ Prepared by Jeffrey Cole and Michael Leidy.

B. Business Taxation and Economic Activity

4. A system of business taxes can affect national output and employment in at least five ways.² First, the overall level and structure of business taxation³ may affect factor demand and output decisions at the firm level and could also affect labor supply decisions, affecting the degree of resource utilization. Second, a tax system that gives preference to some sectors (e.g., manufacturing versus services), and/or asset classes (e.g., machinery, buildings, or inventories), generally induces an inefficient allocation of resources, unless there is an identifiable externality.⁴ Third, an unduly complex system will tend to divert scarce resources from productive employment to unproductive administrative and tax-compliance activity. Fourth, a system with broad scope for interpretation will tend to divert resources to discovering tax-minimization strategies and to associated litigation activities. Such a system also may induce lobbying to achieve a more refined set of rules to codify the tax minimization strategies favored by the more concentrated industries. Fifth, the level and structure of business taxes can affect the equilibrium allocation of foreign direct investment, and thus changes in tax policies may affect such flows. The following section establishes the theoretical framework for the descriptive and analytical overview of Canada's system of business taxes presented in sections III and IV.

The level and structure of business taxation

5. The level and structure of business taxes, in principle, can influence aggregate employment and output decisions by affecting the aggregate supply and/or demand for labor and for capital—the effect, if any, will depend on elasticities of supply and demand. A thorough discussion of the theoretical aspects of taxation and output/unemployment is beyond the scope of this paper, but a review of the empirical work in this area leads to some broad conclusions that suggest the connection between business taxation and

² Possible short-run, demand-side effects captured by the Keynesian fiscal multiplier are well-known and are not discussed here. Rather the focus is on the supply-side effects of business taxation.

³ The term “structure” refers to the mix between payroll taxes, corporate income taxes, and taxes on capital.

⁴ If, for example, there is a positive externality in one sector (e.g., research and development expenditures often yield social value not fully internalized by firms), a tax preference in favor of that sector would help induce movement toward the socially optimal allocation of resources. If, instead, there is a negative externality (pollution associated with manufacturing is an example), the socially optimal allocation of resources would be achieved by applying less favorable tax treatment in the sector producing the negative externality.

employment/unemployment can be largely transitory.⁵ In cross-country studies, there is no clear relationship between the overall tax burden and unemployment, whether one examines industrial, developing, or transition economies. Moreover, attention to the structure of taxation, including the extent and composition of business taxes, offers little to explain cross-country differences in unemployment rates. In a review of the empirical literature covering OECD countries, the findings expressed in IMF (1995, p. 28) can be summarized as follows: (1) "Many studies find that the impact of taxes on unemployment ... are strongest in the short run, and that the effect fades or even disappears in the longer run when the real wage level has adjusted to the tax change," and (2) "A few recent Fund studies for selected OECD countries point to the fact that, although taxation has a measurable independent impact on unemployment, many other—and probably more important—factors are at play, particularly labor market rigidities as reflected in the presence of hysteresis and insider-outsider behavior."⁶

6. Studies that have investigated the employment effects of payroll taxes generally conclude that, while in the short run higher payroll taxes can depress the demand for labor by raising unit labor costs, ultimately payroll taxes tend to be absorbed largely by workers without changing overall employment by very much because the long-run aggregate supply of labor is highly inelastic with respect to real wages.⁷ To the extent that workers view payroll taxes as representing a fee for service (unemployment insurance, health insurance, retirement pensions, and workers compensation) rather than a tax on income, the supply of labor is likely to be even less responsive than otherwise.⁸ Indeed, the closer such fees/taxes are to being commensurate with the expected present value of the services received (i.e., to being actuarially fair), the less they will distort labor supply decisions.

⁵ See IMF (1995) and OECD (1995) for in-depth reviews of taxation and unemployment.

⁶ "Insider-outsider behavior" refers to labor market models that assume asymmetric bargaining positions for workers already employed (insiders) versus those seeking employment (outsiders). Insiders may be able to negotiate real wages in excess of the market-clearing level when labor turnover is costly.

⁷ See, for example, Grignon (1994) and Marchildon, Sargent, and Ruggeri (1996). Grignon (1994), however, observes that sector-specific long-run labor supply elasticities tend to increase as skill levels decline. Thus, while payroll taxes may have a small aggregate employment effect in the long run, effects may be concentrated in low-skill labor markets.

⁸ The cross-country empirical results that suggest little or no permanent employment effects should not be interpreted to mean that payroll taxes specifically, and business taxation more generally, will never affect employment or unemployment. It is easy to imagine prohibitively high levels of taxation, levels not reflected in the empirical work, that would permanently effect employment and unemployment.

7. Certainly labor market rigidities will depend to some degree on the structure of payroll taxes. Canada, for example, recently dropped a provision that established a threshold below which employers paid no unemployment insurance premiums for employees working less than 15 hours per week.⁹ This clearly introduced a degree of friction in the labor market through its affect on the demand for full-time versus part-time employees. However, while business taxes, particularly payroll taxes, may marginally exacerbate labor market rigidities, such rigidities are most frequently attributed to a variety of nontax policies including high minimum wages, elaborate labor protection provisions, and high replacement ratios in unemployment insurance systems (IMF, 1995, p.28; OECD, 1996).

Tax preferences

8. Capital formation across sectors depends, *inter alia*, on how the tax system treats income from firm-level investments in real assets, both in terms of how this income is treated as it accrues to firms and as it is distributed to the ultimate providers of finance (households and other legal entities). The allocation of capital across sectors within an economy depends on the specifics of the system of business taxation as well as the taxation of a financier's investment income.

9. In principle, a fully neutral tax system (one that does not alter investment or financing decisions), in the absence of externalities, would result in an allocation of resources that maximizes the value of economy-wide output.¹⁰ This occurs in a market-based system because resources flow naturally toward those activities with the highest rates of return; i.e., those in which scarce resources are most productive. Nonneutral taxation of capital (i.e., differential tax treatment across sectors, asset classes, means of finance, and/or ownership), by altering after-tax rates of return, diverts resources from their most productive use toward less productive activities, and thus depresses output—in other words, the economy is driven to a point inside its production-possibilities frontier. Thus, even if resources remain fully employed, nonneutralities cause them to be allocated inefficiently, thereby depressing real output. Consequently, reducing tax-based nonneutralities can increase national output by inducing a reallocation of resources toward more productive activities (this proposition is examined more formally in Box 1 below).

⁹ The old and new unemployment insurance systems in Canada are described briefly in Section III.

¹⁰ It has been shown that a tax on a firm's cash flow (revenue net of current and capital costs with no deduction for depreciation or interest) is neutral, in the sense that it does not influence the firm's investment or financing decisions (e.g., Bradford, 1986).

Box 1. Tax Preferences and the Allocation of Capital

The figure presents a stylized model intended to capture the resource-allocation effects of introducing a preferential statutory tax rate on corporate income. In the case depicted, the manufacturing sector is granted a tax preference. Prior to the introduction of the tax preference, the total before-tax return to a unit of physical capital, as measured by the value of the marginal product (A_m^* and A_n^*), the net-of-corporate tax return (B_m^* and B_n^*), and the net-of-personal tax return (C_m^* and C_n^*) are all equalized across manufacturing and nonmanufacturing sectors, assuming capital is fungible. With the introduction of a corporate-income tax preference for manufacturing, given the initial allocation of capital across sectors the after-tax return to capital in manufacturing initially exceeds that in nonmanufacturing. Capital thus begins to flow from nonmanufacturing toward the manufacturing sector. In the figure, for simplicity it is assumed that the allocation of labor across sectors is fixed, as are output prices, otherwise the VMP curves would be shifting. The increased availability of capital, ceteris paribus, tends to decrease the gross (pre-tax) return to the marginal unit of capital (the value of its marginal product) in the manufacturing sector. At the same time, the reduced availability of capital in nonmanufacturing results in an increase in the gross return to capital in that sector. The movement of capital toward manufacturing would continue (under the assumption that capital is fungible and freely mobile across sectors) until the net-of corporate-tax returns were again equalized across sectors. While the allocation of labor across sectors was assumed to be fixed for the sake of simplifying the diagram, labor will also tend to flow toward the sector that was granted new preferences since the increasing capital stock in manufacturing raises the value marginal product of labor.

10. The extent to which the introduction or removal of tax preferences might affect employment and unemployment depends on labor market rigidities, the endogenous effect of tax preferences on the relative price of capital-to-labor, and the elasticity of labor supply. If

ultimately the change in tax preferences across sectors affects the relative price of capital-to-labor, total employment could be effected.¹¹ Moreover, real-world labor markets tend to involve a degree of inflexibility, particularly over short- and medium-term time horizons. Thus, changes in sectoral tax preferences will typically result in a transitional period of frictional and structural unemployment. As a change in sectoral tax preferences induces a reallocation of capital toward the favored sector, the drain of capital from other sectors implies a decline in the value of the marginal product of labor in those other sectors (i.e., the firm-level demand for labor declines) as less capital is now available for each unit of labor. On the other hand, as capital is drawn to the favored sector, the demand for labor will rise there. The duration of the unemployment induced by the introduction (or removal) of sectoral tax preferences is then either mitigated or exacerbated according to whether labor market conditions are more or less conducive to facilitating the transition. The change in tax policy is the trigger for higher transitional unemployment. Thereafter, its duration depends on the characteristics of the labor market.

International tax competition

11. When capital is mobile internationally, an assessment of the consequences of tax preferences for national output (and employment) is more difficult since the available stock of capital cannot be considered fixed, as it depends on the flow of foreign direct investment (FDI). Changes in business taxation at home and abroad can alter these flows and, thus, either exacerbate or mitigate the within-country allocative effects of tax preferences. If, for example, new business tax legislation introduced preferences for the manufacturing sector, the new preferences would initially draw domestic capital (and labor) away from the nonmanufacturing sector and attract new flows of foreign capital. With no impediments to international capital mobility, this reallocation of capital would continue until after-tax returns were again equalized, across sectors and internationally. Of course, international capital mobility is a matter of degree, and the tax elasticity of FDI flows will depend on a number of factors, including the degree to which capital may be country specific and the existence of restrictions on foreign ownership and/or repatriation of profits.

¹¹ If a tax preference for manufacturing also implies a cut in the average tax on capital income this would generally imply that the relative price of labor would rise, *ceteris paribus*, and the economy-wide capital-to-labor ratio would increase, thereby producing a negative impact on aggregate employment. In the longer run, however, the tax cut may stimulate greater investment and thus increase the rate of growth of the capital stock, and with it the demand for labor (see, e.g., IMF, 1995, pp.8–9). Thus, the aggregate employment effect is ambiguous.

12. Because of such spillover effects, normative tax policy analysis must consider the likely endogenous policy response of trading partners.¹² In the case of Canada, business tax policies in the United States are particularly important. It is well accepted that among the most important considerations leading to the July 1986 decision to undertake comprehensive tax reform in Canada was the tax reform initiative underway in the United States.¹³ As observed by Dodge (1989, p.37), "The reduction in U.S. corporate rates demanded a response." The reduction in statutory corporate income tax rates in Canada was intended, in part, to head off capital outflows and a consequent reduction in the domestic capital stock and the corporate income tax base. More generally, Bird (1995, p.1050) has argued that "corporate tax rates will increasingly hew to an international norm set by dominant economies."

13. Sustained employment effects from a change in business tax preferences might occur when international FDI flows are included in the analysis. This is because the domestic stock of capital goods is now endogenous, even in the relatively short run (FDI can literally mean the movement of machinery and equipment across borders, and FDI also often implies the transfer of managerial skills and technologies which complement the existing capital stock). If new tax preferences cause a surge in FDI, the increased stock of capital generally would imply an increase in labor productivity, and so an increase in the aggregate demand for labor and higher real wages. The problem with that scenario, as suggested above, is that countries are not generally passive in the face of such policy changes. Indeed, as discussed in Section IV, developments between 1980 and 1990 regarding effective marginal tax rates on corporate source income were broadly similar in Canada, the United Kingdom, and the United States.¹⁴

Complexity and specificity

14. A tax system can also be evaluated in terms of the cost of compliance and the deadweight loss associated with diverting resources to developing tax-avoidance strategies, to associated litigation activity, and to rent seeking. As a general rule, simplicity and

¹² In other words, the social objective function that is to be maximized must include in its specification policy reaction functions for each trading partner. If the economy were economically small (which, in this context, may not be the case for Canada), policy makers could correctly assume that there would be no response abroad to its tax policy decisions.

¹³ See, for example, *The White Paper: Tax Reform 1987: Income Tax Reform*, p.99, and the discussion in Whalley (1990, pp.81–84).

¹⁴ According to Bird (1995, p.1043), there was a worldwide trend toward lower statutory tax rates on corporate source income and broader tax bases (through reduced capital consumption allowances) during the 1980s.

transparency are essential to minimizing these costs.¹⁵ Simplicity tends to ensure that administrative and compliance costs are kept low, while also reducing the prospects for devising tax-avoidance strategies. Transparency tends to reduce the effectiveness, and thus the extent, of rent seeking by helping to ensure that such activities, if they occur, will be met by a countervailing response from potential losers. It should be noted that investment incentives via capital consumption allowances and sectoral tax preferences (apart from their costly allocative effects) also create complexity and, thereby, increase compliance and administrative costs.

C. The Current Tax Environment for Business in Canada

15. At the aggregate level, it is clear from Table 1 and Chart 1 that there has been a modest downward trend since the mid-1970s in corporate income tax revenues-to-GDP. This trend is also evident in the share of corporate tax revenues in total tax revenues (Table 2 and Chart 1). Corporate income taxes currently account for just over six percent of total Canadian government revenues—a share well below personal income taxes (35 percent), indirect taxes (32 percent), and social insurance revenues (12 percent) (Table 2 and Chart 1). Growth in Canadian payroll taxes has outpaced most other G-7 countries, rising from 4.5 percent of GDP in 1985 to 5.9 percent in 1993. Nevertheless, Canada continues to have one of the lowest payroll tax burdens among the G-7 countries (Chart 4 and Chart 5).

16. The overall business tax environment includes corporate income taxes, payroll taxes, taxes on capital, and selected aspects of the personal income tax, particularly the taxation of dividends and capital gains. It also includes the various tax preferences (credits and deductions) that tend to lower the effective corporate income tax rate relative to the statutory rate. In general, corporate income tax rates in Canada vary according to a firm's size, its production activity, and its provincial location.¹⁶ During the last major reform of the system of business taxes in 1987, efforts were made to minimize the influence of tax considerations on

¹⁵ Because Canada is a federal system, provincial autonomy in tax matters is responsible for some degree of complexity and nontransparency. For example, compliance and administrative costs could be reduced if there were harmonization across provinces and if tax auditing and collection could be centralized. Alternatively, there could be a “disentanglement” of taxes, whereby the federal and provincial governments would agree to allocate the administration and collection of different taxes (corporate income versus excise taxes, for example) to different levels of government (Bird, 1995, p.1051).

¹⁶ A review of tax developments appears, for example, in Daly, Mercier and Schweitzer (1989 and 1993), including pre- and post- reform business taxes with comparative effective tax rates by sector. A snapshot of Canada's current business tax system is available in Government of Canada Tax Expenditures, Department of Finance, (1995), Appendices A and B.

capital investment decisions.¹⁷ This was accomplished by lowering statutory tax rates while broadening the corporate tax base and narrowing the effective tax preferences across sectors.

17. The federal corporate *statutory income tax rate* is set at 28 percent for general business income. However, a number of statutory tax preferences offer reductions from the general rate. Small domestically owned incorporated businesses, or Canadian-controlled private corporations (CCPCs), qualify for a rate reduction of 16 percentage points (to 12 percent) on the first \$200,000 of taxable income. For income in excess of the small-business threshold, the general federal rate is reduced by seven percentage points (to 21 percent) for income derived from manufacturing and processing.¹⁸ The provinces also frequently grant reductions in provincial corporate income tax rates for small businesses and in some cases for manufacturing and processing activities. When both federal and provincial rates are considered, there is significant variation in statutory tax rates on corporate income across Canada. Small business income earned in Newfoundland, for example, faces a 12 percent federal tax together with a 5 percent provincial tax, while general business income earned in New Brunswick faces a 28 percent federal tax along with a 17 percent provincial tax (see tabulation below). Federal and provincial governments also levy an annual tax of 0.225 percent on the paid-up capital of Canadian corporations.¹⁹

18. *Tax credits* restrict the size of the corporate tax base by crediting certain corporate expenditures against the general corporate tax obligation. The current tax code grants tax credits, for example, for certain expenditures on research and development, for investment in eligible depreciable property used in Atlantic Canada, for certain exploration expenditures, and for certain contributions to registered political parties.²⁰ Moreover, tax credits not used in the current tax year may be carried forward.

¹⁷ See International Monetary Fund, Board Paper (1988) for a more detailed description of the latest major round of income tax legislation in Canada.

¹⁸ According to Bird, Perry, and Wilson (1995, p. 159), the term “processing” has been loosely interpreted, with over half of the income of restaurants having been classified as such.

¹⁹ Banks, trust companies, and life insurance companies face additional capital taxes ranging from 0.5 percent to 1.5 percent of capital employed in Canada (Bird, Perry, and Wilson, 1995).

²⁰ Tax credits are discussed in detail in Department of Finance (1995), pp. 75–78.

Federal and Provincial Corporate Income Tax Rates, 1996

	General Business	Manufac- turing and Processing	General Small Business
Federal 1/	28.00	21.00	12.00
Newfoundland	14.00	5.00	5.00
Prince Edward Island	15.00	7.50	7.50
Nova Scotia	16.00	16.00	5.00
New Brunswick	17.00	17.00	7.00
Québec	8.90	8.90	5.75
Ontario	15.50	13.50	9.50
Manitoba	17.00	17.00	9.00
Saskatchewan	17.00	10.00	8.00
Alberta	15.50	14.50	6.00
British Columbia	16.50	16.50	10.00
Yukon	15.00	2.50	6.00
Northwest Territories	14.00	14.00	5.00

Source: Department of Finance, Canada.

1/ In addition, a four percent federal surtax is imposed raising the general business rate to 29.12, the manufacturing and processing rate to 22.12, and the general small business rate to 13.12.

19. A variety of *income exemptions and deductions* also reduce the size of the corporate tax base and, in some cases, may distort investment decisions. There is a twenty-five percent exemption on income from capital gains.²¹ Twenty-five percent of profits from oil and gas, and mining operations may be excluded from taxable income.²² A deduction from taxable income for certain natural-resource exploration and development expenditures and other resource investments (the "earned depletion" deduction) was eliminated in 1990; however, deductions continue on a carry forward basis from pre-1990 earned depletion pools.

²¹ Because capital gains may result from share appreciation owing to retained earnings (which already were taxed as corporate income), the 25 percent exemption on capital gains provides relief from double taxation.

²² This measure is intended to grant the provinces greater scope for imposing royalties and/or mining taxes on natural-resource extraction activities (Department of Finance, 1995, p.79). Provincial royalties on petroleum and mining firms are currently nondeductable.

Regarding the 0.2 percent tax on the paid-up capital of Canadian corporations, there is a \$10 million capital deduction, which effectively exempts smaller corporations from this tax. Other allowable deductions include deductions for charitable donations and gifts to the Crown.

20. The rules governing corporate income *tax deferrals* also affect the size of the tax base and potentially affect the amount and timing of capital expenditure decisions. The tax reform initiated in 1987 brought depreciation schedules more in line with the economic life of each asset, thereby reducing the amount of deferred income that results from capital consumption allowances (CCA). However, a large number of exceptions remain. The cost of capital equipment used for scientific research and experimental development can be fully expensed in the year of acquisition. In addition, a number of asset classes still have arguably fast CCA schedules. The asset classes which receive the most generous provisions include manufacturing and processing assets, vessels, power-operated movable equipment, railway assets, communication satellites, retailer's point-of-sale equipment, application software, energy-efficient equipment, water and air pollution control property, and mining assets.²³ Moreover, a fast write-off is allowed for expenses related to development and exploration.

21. Certain business investment losses may also be deducted from current income. While capital losses are generally deductible only against capital gains, three-quarters of capital losses stemming from the disposition of shares or debts of a small business corporation may be used to offset other income.²⁴ Allowable (noncapital) business losses may be charged against income in the current tax year, and they may also be carried back three years and forward seven years. The fact that capital gains are taxed on a realization basis and not an accrual basis also creates a deferral of taxable income. In addition, there are a number of allowable accounting procedures for agricultural corporations that result in a deferral of taxation.

22. *Payroll taxes* in Canada include unemployment insurance premiums, Canada Pension Plan (CPP) contributions,²⁵ workers compensation premiums, and the provincial health/post-secondary education tax levied by some provinces.²⁶ The structure and level of payroll taxes

²³ See Department of Finance (1995, pp.89–95) for a more detailed description of the capital consumption provision for each asset class listed. Mida and Stewart (1995) present a review and analysis of the Canadian capital cost allowance system.

²⁴ Department of Finance (1995, p.81).

²⁵ The province of Québec has its own separate pension plan that is roughly comparable to the CPP. Residents of Québec have the option of participating in either the CPP or the Québec Pension Plan.

²⁶ Lin, Picot, and Beach (1996) presents a comprehensive review of developments in

(continued...)

vary considerably between provinces. For example, payroll taxes per employee ranged in 1993 from a high of \$3,750 in Québec to a low of about \$2,000 in Saskatchewan (Lin, Picot, and Beach, 1996, p.11).

23. A new unemployment insurance system (the Employment Insurance program) entered into force on July 1, 1996. Under the new system, *unemployment insurance premiums* are collected by the federal government from employers and employees for every dollar earned up to an annual maximum of \$39,000.²⁷ As of January 1, 1997, the employee premium is \$2.90 per \$100 of eligible earnings. Employers pay 1.4 times the employee premium. Small businesses (those paying less than \$60,000 in Employment Insurance premiums) can qualify for a partial premium refund in 1997 and 1998. Low-income workers (earning no more than \$2,000 per year) are also eligible for a premium refund.

24. The CPP is financed through a payroll tax on employees and employers, with the contribution rate adjusted periodically to maintain a balance in the plan equivalent to two years of benefit payments. Employees and employers each currently contribute 2.93 percent on the first \$35,400 of earnings. Allowing for a \$3,500 income exemption, the maximum annual contribution per employee and employer is \$933. Self-employed workers pay the full 5.85 percent with a maximum annual contribution equal to \$1,866.

25. *Workers compensation premiums* are administered by the provinces in order to finance their respective workers compensation programs. Premiums vary according to the hazard or risk of the future use of workers compensation.

26. Québec, Manitoba, Ontario, and Newfoundland assess a *payroll tax on employers to finance provincial health care and post-secondary education systems*. Provincial statutory rates for the health and post-secondary education payroll tax vary from a high of 4.26 percent in Québec to just under 2 percent in Ontario. In addition, Québec is the only province that does not provide relief from this levy for small businesses. The health and post-secondary education payroll tax was the fourth largest source of tax revenues for Manitoba, Ontario, and Newfoundland, and the third largest for Québec (Lin, Picot, and Beach, 1996, p.10).

27. The *individual income tax treatment of dividends and capital gains* can affect the flow of financing and, thus, alter business investment decisions. Three-quarters of net capital gains, beyond a \$500,000 lifetime exemption for farms and small corporations, are taxed as

²⁶ (...continued)

Canadian payroll taxes since 1961.

²⁷ Under the previous system, premiums were not assessed for employees working less than 15 hours per week. The new system abandons this threshold and thus eliminates employer incentives to engage in some premium-avoidance behavior by over hiring part-time workers.

personal income.²⁸ Gains realized from the sale of a principal residence are fully exempt, as are gains from the sale of certain personal property worth less than \$1,000. Dividend income accruing to resident taxpayers from taxable Canadian corporations has been granted partial tax relief for several decades. This relief occurs through a gross-up and credit under the personal income tax. The gross-up and credit has been adjusted periodically with a view to maintaining rough parity in the tax treatment of small corporations and unincorporated businesses (Bird, Perry and Wilson, 1995, p.155). Dividends are currently grossed-up by 25 percent and this grossed-up amount is taken into taxable income. The federal "basic tax"²⁹ is then applied to personal income including grossed-up dividends, before the federal tax is reduced by a credit equal to 13.33 percent of the grossed-up dividend. When provincial taxes are taken into account, the net effect is to offset the double taxation of corporate source income accruing to individuals by roughly 50 percent for public companies and 100 percent for private corporations.

D. Estimates of Effective Marginal Tax Rates in Canada

28. Because business tax systems are generally complex, and distortions can be offsetting or reinforcing, the net nonneutralities present in a system cannot typically be assessed from a description of the regime. The related concepts of "cost of capital" and "marginal effective tax rate" were developed to help capture the net effects of the tax system on business incentives (see Box 2 below). This section presents estimates of marginal effective tax rates in Canada on new investments across sectors, asset groups, means of finance, and ownership. It also includes figures from two comparator countries, the United States and the United Kingdom. These figures offer summary estimates of the extent and nature of the nonneutralities present in Canada's business tax regime, both before and after the last major reform initiated in 1987.

29. Jorgenson (1993) and Daly, Mercier, and Schweitzer (1993) estimated marginal effective tax rates for Canada and other G-7 countries at five-year intervals from 1980–1990, using the methodology developed by King and Fullerton (1984).³⁰ King and Fullerton first observed that the marginal effective tax rate applicable to any given investment project will generally depend on four primary factors: (1) the type of asset being purchased for an investment project; (2) the industry in which the investment takes place; (3) the means of finance; and (4) the ultimate owner of the net returns to the project (the financier).

²⁸ The 1994 Budget terminated a \$100,000 lifetime exclusion on all capital gains.

²⁹ Bird, Perry, and Wilson (1995, p.156) describe the federal "basic tax" as "a term of art that describes the result of applying the rate schedule to taxable income and then allowing for certain adjustments".

³⁰ The King-Fullerton methodology is based on the assumption of a closed-economy.

Box 2. Fundamental Business Tax Concepts

The related concepts of the "cost of capital" and the "marginal effective tax rate" are the most commonly employed analytical tools for determining the net incentive effects of a system of business taxes. The cost of capital is the minimum pre-tax rate of return that an investment project must yield in order to induce an economic agent (firm or individual) to undertake an investment project.¹ This, of course, depends on the alternative rates of return on financial investments. But given the opportunity cost implied by alternative returns in financial markets, the specific structure of the tax system is a major determinant of the cost of capital across sectors (e.g., manufacturing versus nonmanufacturing), asset classes (e.g., machinery, buildings, or inventories), owners (e.g., tax-exempt institutions, households, or insurance companies), and methods of finance (debt, retained earnings, or new shares). Anything that changes the cost of capital (including, for example, enhanced risk, increases in the statutory tax rate on corporate or personal investment income, changes in the risk-free rate of return, and changes in the expected rate of return on other financial assets) will generally alter the level and allocation of real investment expenditures.

A closely related concept, the marginal effective tax rate, assesses the taxes paid as a share of the income generated by the marginal unit of a specific type of capital employed by an economic agent.² This concept can be evaluated at the level of the firm (marginal effective corporate tax rate), at the level of an individual investor (marginal effective personal tax rate on corporate-source income), or in total (marginal effective tax rate on corporate-source income). The marginal effective corporate tax rate reflects the net-of-corporate-tax return to the firm from a specific investment. The marginal effective personal tax rate on corporate-source income reflects the return net of personal taxes to a financier of a firm's investment. The marginal effective corporate tax rate directly affects the investment decisions of firms, whereas the marginal effective personal tax rate on corporate source investment income directly affects the amount and composition (equity versus corporate debt) of household savings channeled to corporate investment. The figure displays the relationship between these and other fundamental tax concepts.

An example will help to convey the close relationship between the marginal effective tax rate and the cost of capital. Suppose that the interest rate structure (and thus the opportunity cost of the investment project) is fixed, as is the expected yield on (and the riskiness of) a physical investment project. Given these, the cost of capital (OA in the figure below) is judged just sufficient (i.e., it satisfies the "hurdle rate") to induce the firm to undertake the marginal investment expenditure in that project. Since corporate decision makers presumably care about after tax returns, this implies that the

¹This definition is generalized from King and Fullerton (1984, p. 10). Shoven and Topper (1992, p. 218) express the same concept with a risk element as "the expected net rate of return before corporate taxes that is required in order for an incremental real investment to be in the interest of the owners of the firm." See also Copeland and Weston (1983, p. 383) for a discussion of the "cost of capital." This concept is also referred to as the "hurdle rate."

²This definition is generalized from McKenzie and Mintz (1992, p. 190).

Box 2. Fundamental Business Tax Concepts (Concluded)

after tax return OB is just sufficient to go forward with the marginal expenditure for this project. Now suppose the marginal effective corporate tax rate increases. The cost of capital increases and investment takes place only in those projects expected to provide a pre-tax return at least as great as the new higher cost of capital, thereby achieving the original after-tax returns OB (corporate level) and OC (personal level). Had the marginal effective personal tax rate changed instead, an analogous scenario would have applied to the financing decision. Thus, a change in marginal effective tax rates alters the cost of capital and affects capital expenditure decisions.

Because tax laws typically make distinctions even within these broad categories, King and Fullerton further divided these four categories into three sub-types, thus, identifying 81 types of investment projects, each possibly with a different marginal effective tax rate. The marginal effective tax rates reported in Tables 3–5 are weighted mean marginal effective tax rates over each of the four primary King-Fullerton categories.³¹ Table 3 presents these weighted-average estimates at the corporate level for Canada, the United States, and the United Kingdom, across each of the four King-Fullerton categories. Table 4 presents comparable estimates of

³¹ For example, the reported marginal effective tax rate applicable to investment in machinery is a weighted average of rates on machinery across every combination of industry, source of finance, and ownership category. Similarly, the reported marginal rate for an investment in the manufacturing sector is the weighted average over all possible combinations of asset class, source of finance, and ownership.

the marginal effective personal tax rates on corporate source investment income, and Table 5 presents estimates of the combined marginal effective corporate and personal tax rates.

30. The data in Table 3 show that in Canada the dispersion of marginal effective corporate tax rates across assets, industries, means of finance, and owners narrowed substantially following implementation of the 1987 reforms. In particular, the effective marginal tax rates for "manufacturing" over "other industry" and "commerce" narrowed considerably between 1985 and 1990, with the variance of rates across the three sub-groups declining from 76.2 in 1985 to just 6.4 in 1990.³² The preferential tax treatment of machinery and inventory investments relative to buildings also narrowed over this period, although the capital cost allowances for machinery continued to be more generous than allowances for buildings. The more favorable treatment of debt-financed investments relative to investments financed through retained earnings or new shares was reduced as well. All the while, the overall effective tax rate at the corporate level increased in Canada. Although the statutory corporate tax rates fell, this was more than offset by less generous capital cost allowances.

31. The dispersion of marginal effective tax rates at the corporate level across sectors also narrowed in both the United Kingdom and the United States between 1985 and 1990. Preferences for nonmanufacturing sectors in the United States declined significantly following the 1986 tax reforms. In the United Kingdom, effective subsidies³³ for manufacturing and other industry had been eliminated by 1985, and the variance of the effective tax burden across sectors was narrowed still further by 1990. As in Canada, the variance of marginal effective tax rates across asset classes and means of finance also declined between 1985 and 1990 in both the United Kingdom and the United States. Even in the case of ownership categories, the dispersion of marginal effective corporate tax rates declined for all three countries between 1985 and 1990, although the drop was most significant in the cases of Canada and the United Kingdom. Overall effective corporate tax rates in Canada, the United States, and the United Kingdom all rose between 1985 and 1990; in Canada, from 19 percent to 25.9 percent; in the United States, from 9.2 percent to 24 percent;³⁴ and in the United Kingdom, from 21.4 percent to 28.0 percent.

32. Movement toward reduced effective rate dispersion is also evident at the personal level (Table 4) in Canada, the United States, and the United Kingdom from 1985 to 1990, although the dispersion of effective rates across industries in Canada rose slightly. The overall effective marginal tax rate on personal corporate source income in Canada declined slightly over this period. Downward movement in the overall effective rate was also evident in the

³² This refers to the simple variance across the three reported sectors.

³³ "Effective subsidies" refers to negative marginal effective tax rates.

³⁴ Substantial "investment incentives" in the U.S. 1981 tax act were reversed in the Tax Reform Act of 1986.

United States and the United Kingdom between 1980 and 1990. While effective rate dispersion in the United States was already quite low across industries and asset classes in 1980, and remained low in 1985, appreciable differences in treatment existed across sources of finance and, more significantly, ownership. Rate dispersion in the United States was narrowed in both of these areas between 1980 and 1990. The United Kingdom evidenced significantly greater rate dispersion in 1980 in every category compared to both Canada and the United States. However, reforms led to a significant narrowing of marginal effective personal tax rates on corporate source income by 1985, and a significant further narrowing was achieved by 1990. By 1990, the United States evidenced the lowest rate dispersion in every category except in the personal tax treatment of corporate source income across different owners of capital.

33. Overall, Tables 3 and 4 reveal a significant trend toward reducing nonneutralities between 1980 and 1990 in almost every King-Fullerton category. During the same period, effective marginal corporate tax rates generally were rising in Canada and the United Kingdom (in the United States, these rates eventually rose), while the marginal effective personal tax rates on corporate source investment income generally were declining in the United States and the United Kingdom (in Canada these rates remained essentially unchanged).

34. Table 5 combines corporate and personal taxation to assess the total taxation at the margin of corporate source income across each of the four King-Fullerton categories. The overall effective tax rate ultimately moved upward for all three countries between 1980 and 1990; although it briefly dipped in the United States before rising to a higher level. All three countries reveal significant movement toward reducing differential tax treatment of corporate source investment income across the King-Fullerton categories, particularly since 1985.

35. In sum, the last major business tax reform in Canada achieved a significant narrowing of the dispersion of marginal effective tax rates on corporate source investment income, and this change was in line with policy developments in the United States and the United Kingdom. Nevertheless, appreciable nonneutralities remain in the effective tax treatment of corporate-source income in every King-Fullerton category, suggesting that opportunities for efficiency gains through business tax reform in Canada remain.

E. Concluding Comments

36. A number of observations can be drawn from this overview of business taxation in Canada. In terms of marginal effective tax rates, payroll taxes, and the overall tax burden imposed on the corporate sector, Canada compares well with the United States and the United Kingdom. Moreover, the literature generally concludes that unemployment associated with the level and structure of business taxation (and/or changes in these) tends in large part to be

transitory, although this period of adjustment may be quite lengthy.³⁵ The last major reform of Canada's tax regime moved the corporate tax system closer to neutrality by reducing preferences and revising capital consumption allowances more in line with the economic life of assets. Nevertheless, there continues to be scope for improving the neutrality of the system and, thereby, improving resource allocation. Changing tax preferences, however, whether distortions are mitigated or exacerbated, disturbs the equilibrium allocation of factors of production and, thus, generates transitional periods (the duration of which will depend on factor market rigidities) in which some factors (including labor) will be underemployed. When assessing the economic implications of a reform proposal, such transitional employment effects must be traded off against permanent improvements in output from enhanced allocative efficiency. Highly open economies such as Canada must consider the prospective response of major trading partners, if any, to changes in business taxes in order to properly assess the consequences for FDI flows. This implies, for example, that a step toward greater neutrality in the treatment of corporate-source income across industries (say by raising the statutory tax rate on manufacturing), could induce capital outflows that lessen, or perhaps overwhelm, the associated static improvement in resource allocation. Finally, business tax reforms that move toward greater simplicity and transparency will mitigate the deadweight loss associated with tax-compliance, tax-minimization, tax litigation, and rent seeking activities.

37. The Technical Committee on Business Taxation will present in-depth coverage of many of the issues examined here. The Committee is undertaking a comprehensive review of Canada's system of business taxation with the guiding objectives of promoting the creation and retention of jobs in Canada, ensuring that multi-national companies pay the intended level of tax on their business activity in Canada, and ensuring effective tax compliance while seeking ways in which compliance costs for taxpayers could be reduced. The study will also examine the structure of corporate income and capital taxes, the employment impact of payroll taxes, and the integration of corporate and personal taxes.³⁶

³⁵ The empirical work in the next paper in this report, "Labor Markets in Canada" suggests, for example, that labor market adjustment to an increase in payroll taxes takes place over roughly a six-year period.

³⁶ Department of Finance Canada, Press Release (November 5, 1996), "Martin Grants Extension to Technical Committee on Business Taxation."

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Table 1. Canada: Tax Revenues

(In percent of GDP)

	General Government						Federal Government						Provincial and Local Governments 1/					
	Cor- porate Income	Per- sonal Income	Social Ins. 2/	Indirect	Other	Total	Cor- porate Income	Per- sonal Income	Social Ins. 2/	Indirect	Other	Total	Cor- porate Income	Per- sonal Income	Social Ins. 2/	Indirect	Other	Total
1970	3.45	10.93	2.03	13.38	4.55	34.33	2.56	7.79	1.42	4.53	1.75	17.18	0.89	3.13	0.61	8.86	2.48	15.65
1971	3.44	11.43	1.98	13.28	4.71	34.84	2.54	7.99	1.39	4.60	1.80	17.48	0.89	3.45	0.59	8.68	2.51	15.82
1972	3.61	11.42	2.05	13.46	4.64	35.18	2.67	7.90	1.44	4.72	1.83	17.76	0.94	3.51	0.61	8.75	2.37	15.87
1973	3.98	11.31	2.09	12.98	4.55	34.91	2.86	7.83	1.45	4.58	1.70	17.68	1.13	3.48	0.64	8.40	2.39	15.74
1974	4.64	11.49	2.46	13.60	4.95	37.14	3.30	7.87	1.81	5.59	1.68	19.45	1.34	3.62	0.65	8.01	2.79	16.15
1975	4.37	11.39	2.69	12.42	5.10	35.97	3.14	7.75	1.97	4.65	1.63	18.29	1.23	3.64	0.72	7.78	2.95	16.05
1976	3.61	11.46	2.90	12.47	5.26	35.69	2.56	7.86	2.07	4.41	1.59	17.68	1.05	3.60	0.83	8.06	3.09	16.33
1977	3.33	11.78	2.83	12.41	5.58	35.92	2.36	7.12	2.01	4.24	1.69	16.58	0.97	4.66	0.82	8.17	3.28	17.63
1978	3.38	11.11	2.85	11.94	6.21	35.49	2.37	6.17	2.00	4.08	1.79	15.57	1.01	4.94	0.85	7.87	3.77	18.14
1979	3.63	10.88	2.67	11.64	6.48	35.30	2.48	6.32	1.86	3.90	1.74	15.45	1.15	4.56	0.82	7.74	4.07	18.04
1980	3.90	11.15	2.65	11.46	6.90	36.06	2.71	6.55	1.85	3.95	1.85	16.07	1.19	4.60	0.80	7.51	4.33	18.12
1981	3.60	11.87	2.96	12.90	6.94	38.28	2.63	6.87	2.17	5.33	1.84	17.99	0.98	4.99	0.80	7.58	4.34	18.42
1982	3.14	12.63	3.11	12.89	7.09	38.85	2.46	7.30	2.26	4.70	1.65	17.40	0.68	5.33	0.85	8.19	4.57	19.33
1983	3.03	12.29	3.40	12.36	7.33	38.42	2.35	7.03	2.58	4.02	1.79	16.91	0.69	5.26	0.82	8.34	4.66	19.50
1984	3.37	11.92	3.42	12.36	7.41	38.47	2.55	6.73	2.60	4.07	1.88	16.94	0.82	5.19	0.83	8.28	4.62	19.47
1985	3.26	12.12	3.59	12.31	7.21	38.48	2.42	7.10	2.74	3.96	1.85	17.16	0.83	5.02	0.86	8.35	4.45	19.21
1986	2.88	13.07	3.77	12.72	6.76	39.20	2.04	7.78	2.83	4.18	1.96	17.87	0.84	5.28	0.94	8.54	3.87	19.17
1987	3.08	13.48	3.83	12.93	6.35	39.68	2.15	7.92	2.84	4.29	1.80	18.02	0.93	5.56	1.00	8.64	3.65	19.46
1988	2.90	13.73	3.96	13.04	6.41	40.05	1.96	7.95	2.91	4.27	1.95	18.05	0.95	5.79	1.05	8.77	3.58	19.82
1989	2.86	13.67	3.69	13.35	6.69	40.25	1.97	8.09	2.61	4.41	1.98	18.04	0.89	5.58	1.07	8.94	3.84	19.99
1990	2.51	15.57	4.15	13.10	6.57	41.90	1.74	9.00	3.11	3.97	2.11	18.76	0.78	6.57	1.05	9.13	3.58	20.75
1991	2.22	15.72	4.40	13.84	6.37	42.56	1.53	9.06	3.47	4.46	2.10	19.38	0.69	6.66	0.94	9.38	3.39	20.70
1992	2.10	15.33	4.88	14.16	6.33	42.81	1.45	9.00	3.90	4.51	2.09	19.64	0.65	6.33	0.97	9.66	3.39	20.63
1993	2.05	14.79	4.91	14.02	6.31	42.09	1.42	8.56	3.95	4.26	1.99	18.84	0.64	6.23	0.97	9.76	3.51	20.73
1994	2.34	14.47	4.98	13.80	6.33	41.92	1.62	8.23	4.00	4.05	1.98	18.55	0.72	6.25	0.98	9.75	3.59	20.88
1995	2.60	14.80	4.98	13.53	6.48	42.38	1.79	8.55	3.96	3.90	2.13	18.88	0.81	6.24	1.01	9.63	3.61	20.89

Sources: Statistics Canada (National Income and Expenditure Accounts); and Fund staff estimates.

1/ Own-source revenue only. Excluding tax revenues of the hospital sector which are included in total general government revenue.

2/ Includes: direct tax revenues of the federal Canada Pension Plan (CPP) and the provincial Quebec Pension Plan (QPP); federal unemployment insurance contributions; and provincial workers' compensation contributions. Note, this is not a complete representation of payroll taxes.

Table 1. United States: Tax Revenues (Concluded)

(In percent of GDP)

	General Government						Federal Government						State and Local Governments 1/					
	Cor- porate Income	Per- sonal Income	Social	Indirect	Other	Total	Cor- porate Income	Per- sonal Income	Social Ins. 2/	Indirect	Other	Total	Cor- porate Income	Per- sonal Income	Social Ins. 2/	Indirect	Other	Total
1970	3.32	10.53	5.99	9.10	0.98	29.92	2.96	8.91	5.09	1.76	0.22	18.94	0.36	1.62	0.89	6.60	1.52	10.98
1971	3.36	9.65	6.18	9.20	0.96	29.35	2.98	7.99	5.28	1.70	0.22	18.16	0.38	1.67	0.90	6.74	1.51	11.20
1972	3.38	10.67	6.43	9.00	1.03	30.51	2.96	8.72	5.50	1.50	0.26	18.94	0.42	1.96	0.93	6.71	1.56	11.58
1973	3.57	10.16	7.08	8.76	1.06	30.63	3.13	8.26	6.14	1.44	0.21	19.19	0.43	1.90	0.94	6.54	1.63	11.44
1974	3.46	10.63	7.46	8.64	1.16	31.34	3.02	8.74	6.49	1.35	0.22	19.82	0.44	1.88	0.98	6.49	1.73	11.53
1975	3.11	9.59	7.43	8.59	1.04	29.76	2.66	7.69	6.39	1.36	0.12	18.23	0.45	1.90	1.03	6.45	1.70	11.53
1976	3.53	10.02	7.57	8.33	1.11	30.57	3.00	8.05	6.50	1.19	0.24	18.98	0.53	1.97	1.07	6.38	1.64	11.59
1977	3.60	10.37	7.67	8.17	1.10	30.91	3.04	8.35	6.58	1.13	0.24	19.33	0.56	2.02	1.09	6.28	1.62	11.57
1978	3.64	10.48	7.73	7.77	1.32	30.93	3.11	8.45	6.65	1.12	0.37	19.70	0.53	2.02	1.08	5.89	1.72	11.23
1979	3.45	10.95	7.99	7.38	1.54	31.30	2.91	8.98	6.91	1.02	0.43	20.25	0.53	1.97	1.07	5.54	1.93	11.05
1980	3.04	11.22	8.08	7.61	1.72	31.67	2.53	9.20	7.02	1.22	0.49	20.46	0.52	2.02	1.07	5.45	2.17	11.22
1981	2.61	11.56	8.40	8.00	1.92	32.48	2.11	9.54	7.35	1.61	0.64	21.26	0.50	2.02	1.04	5.39	2.27	11.22
1982	1.95	11.46	8.66	7.91	2.23	32.20	1.51	9.34	7.55	1.28	0.71	20.39	0.43	2.11	1.11	5.60	2.56	11.81
1983	2.19	10.52	8.59	7.97	2.43	31.71	1.74	8.35	7.52	1.28	0.77	19.66	0.45	2.17	1.07	5.68	2.68	12.05
1984	2.41	10.13	8.85	7.93	2.48	31.81	1.93	7.90	7.83	1.23	0.76	19.65	0.48	2.23	1.03	5.66	2.76	12.16
1985	2.31	10.47	8.99	7.89	2.72	32.38	1.82	8.22	7.97	1.12	0.86	19.99	0.48	2.25	1.02	5.70	2.93	12.38
1986	2.41	10.40	9.09	7.80	2.83	32.52	1.90	8.10	8.02	1.00	0.84	19.85	0.51	2.30	1.07	5.75	3.03	12.66
1987	2.71	10.95	9.02	7.78	2.71	33.17	2.20	8.57	7.98	1.01	0.74	20.49	0.51	2.38	1.05	5.78	2.95	12.68
1988	2.71	10.54	9.17	7.64	2.70	32.75	2.20	8.21	8.14	1.01	0.68	20.24	0.52	2.33	1.03	5.73	2.91	12.51
1989	2.60	10.94	9.03	7.63	2.73	32.92	2.15	8.52	8.04	0.93	0.66	20.30	0.45	2.42	0.99	5.81	2.96	12.62
1990	2.45	10.88	9.03	7.71	2.66	32.71	2.05	8.46	8.03	0.92	0.63	20.09	0.39	2.42	1.00	5.89	2.92	12.62
1991	2.25	10.56	9.19	8.08	2.68	32.76	1.86	8.06	8.16	1.06	0.70	19.83	0.40	2.50	1.03	6.04	2.95	12.92
1992	2.29	10.42	9.15	8.10	2.51	32.47	1.90	7.86	8.12	1.03	0.58	19.49	0.39	2.56	1.03	6.08	2.91	12.97
1993	2.50	10.53	9.05	8.24	2.37	32.68	2.10	7.99	8.03	1.05	0.56	19.73	0.40	2.54	1.02	6.21	2.78	12.95
1994	2.81	10.55	9.06	8.25	2.27	32.95	2.37	8.09	8.05	1.07	0.56	20.15	0.44	2.45	1.01	6.24	2.66	12.80
1995	3.01	10.95	9.10	8.21	2.26	33.54	2.54	8.48	8.11	1.05	0.58	20.75	0.47	2.47	0.99	6.27	2.58	12.79

Sources: Bureau of Economic Analysis, U.S. Department of Commerce; and Fund staff estimates.

1/ Own-source revenue only.

2/ Includes: federal old-age, survivors, disability, and hospital insurance contributions; federal and state unemployment insurance contributions; federal and state employee pension contributions; and other federal and state social insurance programs, including workers compensation. Note, this is not a complete representation of payroll taxes.

Table 2. Canada: Tax Revenues

(In percent of total revenues)

	General Government						Federal Government						Provincial and Local Governments 1/					
	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total
1970	10.04	31.83	5.90	38.98	13.24	100.00	14.88	45.37	8.24	26.35	10.20	100.00	5.70	20.03	3.90	56.57	15.82	100.00
1971	9.86	32.82	5.67	38.12	13.52	100.00	14.55	45.69	7.94	26.34	10.31	100.00	5.64	21.79	3.71	54.83	15.89	100.00
1972	10.25	32.45	5.83	38.27	13.20	100.00	15.02	44.50	8.12	26.55	10.32	100.00	5.90	22.12	3.84	55.09	14.91	100.00
1973	11.40	32.40	5.98	37.18	13.04	100.00	16.15	44.28	8.21	25.92	9.64	100.00	7.15	22.11	4.04	53.33	15.19	100.00
1974	12.49	30.95	6.62	36.61	13.33	100.00	16.95	40.47	9.28	28.74	8.64	100.00	8.30	22.42	4.05	49.57	17.30	100.00
1975	12.14	31.67	7.47	34.54	14.19	100.00	17.14	42.34	10.75	25.40	8.91	100.00	7.68	22.71	4.48	48.46	18.41	100.00
1976	10.10	32.11	8.12	34.94	14.73	100.00	14.48	44.48	11.73	24.97	9.00	100.00	6.40	22.03	5.05	49.34	18.96	100.00
1977	9.26	32.80	7.88	34.53	15.53	100.00	14.23	42.94	12.13	25.55	10.22	100.00	5.48	26.45	4.65	46.33	18.61	100.00
1978	9.53	31.29	8.02	33.66	17.50	100.00	15.21	39.60	12.85	26.19	11.52	100.00	5.58	27.23	4.66	43.36	20.77	100.00
1979	10.29	30.81	7.57	32.97	18.36	100.00	16.05	40.89	12.01	25.23	11.25	100.00	6.37	25.25	4.52	42.88	22.53	100.00
1980	10.81	30.93	7.34	31.79	19.13	100.00	16.87	40.77	11.50	24.59	11.50	100.00	6.55	25.38	4.40	41.44	23.89	100.00
1981	9.42	31.00	7.74	33.71	18.13	100.00	14.59	38.21	12.05	29.62	10.22	100.00	5.31	27.11	4.32	41.14	23.59	100.00
1982	8.08	32.52	8.00	33.17	18.24	100.00	14.13	41.99	12.98	27.01	9.51	100.00	3.51	27.57	4.40	42.36	23.65	100.00
1983	7.90	32.00	8.85	32.17	19.08	100.00	13.89	41.58	15.26	23.76	10.57	100.00	3.52	27.00	4.21	42.80	23.88	100.00
1984	8.76	30.97	8.90	32.12	19.25	100.00	15.03	39.71	15.33	24.05	11.09	100.00	4.23	26.66	4.25	42.55	23.74	100.00
1985	8.46	31.48	9.34	31.98	18.74	100.00	14.13	41.37	15.96	23.08	10.76	100.00	4.33	26.10	4.45	43.44	23.15	100.00
1986	7.35	33.33	9.62	32.45	17.24	100.00	11.41	43.57	15.86	23.42	10.97	100.00	4.40	27.56	4.90	44.53	20.18	100.00
1987	7.76	33.97	9.66	32.60	16.01	100.00	11.93	43.93	15.74	23.81	10.01	100.00	4.77	28.56	5.12	44.41	18.75	100.00
1988	7.25	34.30	9.89	32.57	16.00	100.00	10.85	44.03	16.14	23.66	10.83	100.00	4.77	29.21	5.29	44.26	18.05	100.00
1989	7.10	33.97	9.16	33.16	16.62	100.00	10.92	44.87	14.49	24.45	10.98	100.00	4.44	27.90	5.37	44.71	19.21	100.00
1990	6.00	37.15	9.91	31.26	15.68	100.00	9.27	47.98	16.57	21.15	11.23	100.00	3.74	31.63	5.04	44.00	17.27	100.00
1991	5.22	36.93	10.35	32.52	14.98	100.00	7.89	46.75	17.89	23.03	10.84	100.00	3.33	32.18	4.53	45.31	16.40	100.00
1992	4.91	35.81	11.39	33.09	14.79	100.00	7.38	45.81	19.87	22.94	10.66	100.00	3.17	30.69	4.72	46.80	16.45	100.00
1993	4.87	35.15	11.67	33.31	14.99	100.00	7.52	45.46	20.94	22.61	10.56	100.00	3.07	30.05	4.66	47.10	16.93	100.00
1994	5.58	34.53	11.87	32.93	15.10	100.00	8.72	44.36	21.58	21.86	10.68	100.00	3.45	29.92	4.67	46.69	17.18	100.00
1995	6.13	34.92	11.74	31.92	15.29	100.00	9.48	45.31	20.99	20.64	11.26	100.00	3.87	29.89	4.85	46.09	17.27	100.00

Sources: Statistics Canada (National Income and Expenditure Accounts); and Fund staff estimates.

1/ Own-source revenue only. Excluding tax revenues of the hospital sector which are included in total general government revenue.

2/ Includes: direct tax revenues of the federal Canada Pension Plan (CPP) and the provincial Quebec Pension Plan (QPP); federal unemployment insurance contributions; and provincial workers' compensation contributions. Note, this is not a complete representation of payroll taxes.

Table 2. United States: Tax Revenues (Concluded)

(In percent of total revenues)

	General Government						Federal Government						State and Local Governments 1/					
	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total	Corporate Income	Personal Income	Social Ins. 2/	Indirect	Other	Total
1970	11.09	35.19	20.01	30.42	3.28	100.00	15.61	47.06	26.89	9.27	1.15	100.00	3.28	14.73	8.13	60.08	13.80	100.00
1971	11.43	32.89	21.07	31.36	3.26	100.00	16.39	44.01	29.07	9.35	1.21	100.00	3.41	14.87	8.07	60.16	13.51	100.00
1972	11.08	34.97	21.08	29.50	3.37	100.00	15.61	46.02	29.06	7.93	1.38	100.00	3.64	16.89	8.01	57.98	13.45	100.00
1973	11.64	33.18	23.12	28.59	3.46	100.00	16.32	43.08	32.01	7.51	1.08	100.00	3.79	16.59	8.20	57.18	14.23	100.00
1974	11.04	33.91	23.80	27.55	3.69	100.00	15.22	44.12	32.73	6.82	1.12	100.00	3.86	16.34	8.47	56.29	15.03	100.00
1975	10.45	32.22	24.95	28.85	3.51	100.00	14.61	42.19	35.09	7.48	0.65	100.00	3.89	16.50	8.94	55.89	14.75	100.00
1976	11.56	32.78	24.78	27.26	3.62	100.00	15.83	42.44	34.25	6.25	1.24	100.00	4.58	16.96	9.26	55.04	14.16	100.00
1977	11.66	33.54	24.81	26.42	3.57	100.00	15.71	43.17	34.02	5.85	1.25	100.00	4.87	17.46	9.41	54.24	14.01	100.00
1978	11.76	33.86	24.99	25.12	4.26	100.00	15.79	42.91	33.78	5.66	1.86	100.00	4.70	18.00	9.59	52.44	15.29	100.00
1979	11.01	34.99	25.51	23.58	4.92	100.00	14.39	44.32	34.14	5.03	2.13	100.00	4.80	17.87	9.71	50.16	17.47	100.00
1980	9.61	35.42	25.52	24.03	5.42	100.00	12.35	44.98	34.29	5.96	2.41	100.00	4.63	17.98	9.52	48.57	19.30	100.00
1981	8.03	35.59	25.85	24.63	5.90	100.00	9.93	44.86	34.59	7.60	3.02	100.00	4.42	18.02	9.30	48.01	20.26	100.00
1982	6.04	35.58	26.88	24.56	6.93	100.00	7.42	45.82	37.03	6.26	3.47	100.00	3.67	17.90	9.36	47.39	21.67	100.00
1983	6.91	33.17	27.11	25.14	7.67	100.00	8.85	42.48	38.26	6.50	3.91	100.00	3.75	18.00	8.90	47.13	22.23	100.00
1984	7.59	31.85	27.84	24.93	7.78	100.00	9.83	40.21	39.83	6.26	3.88	100.00	3.96	18.36	8.47	46.50	22.71	100.00
1985	7.13	32.34	27.78	24.36	8.39	100.00	9.12	41.13	39.85	5.59	4.31	100.00	3.91	18.15	8.28	46.01	23.66	100.00
1986	7.40	31.98	27.96	23.97	8.69	100.00	9.55	40.81	40.40	5.02	4.23	100.00	4.04	18.14	8.45	45.41	23.96	100.00
1987	8.16	33.02	27.20	23.44	8.18	100.00	10.72	41.83	38.92	4.91	3.63	100.00	4.01	18.80	8.27	45.62	23.30	100.00
1988	8.28	32.18	27.99	23.31	8.24	100.00	10.86	40.56	40.21	5.01	3.37	100.00	4.12	18.62	8.22	45.77	23.28	100.00
1989	7.90	33.22	27.43	23.16	8.29	100.00	10.61	41.97	39.59	4.59	3.23	100.00	3.54	19.14	7.88	46.02	23.43	100.00
1990	7.48	33.25	27.60	23.56	8.12	100.00	10.22	42.09	39.97	4.56	3.16	100.00	3.10	19.19	7.91	46.70	23.10	100.00
1991	6.88	32.24	28.04	24.67	8.17	100.00	9.35	40.65	41.12	5.36	3.51	100.00	3.10	19.33	7.96	46.76	22.85	100.00
1992	7.06	32.08	28.19	24.94	7.73	100.00	9.75	40.32	41.66	5.27	3.00	100.00	3.01	19.72	7.94	46.87	22.46	100.00
1993	7.64	32.21	27.69	25.21	7.24	100.00	10.63	40.49	40.68	5.34	2.86	100.00	3.10	19.59	7.88	47.97	21.46	100.00
1994	8.54	32.01	27.50	25.06	6.90	100.00	11.76	40.17	39.97	5.31	2.79	100.00	3.48	19.16	7.86	48.73	20.78	100.00
1995	8.99	32.65	27.13	24.48	6.75	100.00	12.24	40.85	39.07	5.05	2.79	100.00	3.71	19.34	7.76	49.01	20.18	100.00

Sources: Bureau of Economic Analysis, U.S. Department of Commerce; and Fund staff estimates.

1/ Own source revenue only.

2/ Includes: federal old-age, survivors, disability, and hospital insurance contributions; federal and state unemployment insurance contributions; federal and state employee pension contributions; and other federal and state social insurance programs, including workers compensation. Note, this is not a complete representation of payroll taxes.

Table 3. Canada: Marginal Effective Corporate Tax Rates

(In percent)

	Canada			United States			United Kingdom		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Industry ¹									
Manufacturing	10.3	11.2	24.5	33.8	27.5	34.0	-53.3	14.7	24.8
Other industry	25.6	28.3	29.1	-13.7	-16.7	11.7	-24.2	14.5	21.2
Commerce	19.2	22.8	25.0	15.5	9.2	21.8	12.7	38.9	37.8
Variance ²	59.30	76.20	6.40	574.00	493.20	124.70	1,094.10	196.80	76.30
Asset									
Machinery	4.3	8.2	15.5	-12.0	-18.6	18.5	-67.0	-5.4	8.0
Buildings	30.3	31.6	35.9	19.1	12.2	25.3	20.4	43.9	49.7
Inventories	20.6	20.4	30.7	28.5	28.7	26.3	-34.2	46.8	39.8
Variance ²	172.60	137.00	112.40	449.30	576.40	18.00	1,949.30	860.60	474.70
Source of Finance									
Debt	-25.0	-20.5	-6.3	-49.2	-55.5	-14.7	-157.8	-36.8	-15.9
New shares	44.7	45.2	47.2	47.1	43.0	44.1	-61.2	-10.1	4.1
Retained earnings	44.7	45.3	47.3	45.6	42.1	43.7	2.3	38.0	40.5
Variance ²	1,619.40	1,441.00	955.90	3,043.80	3,204.80	1,144.70	6,499.30	1,436.90	817.70
Owner									
Households	19.2	21.2	26.9	15.8	9.5	23.6	-45.5	14.9	23.1
Tax-exempt institutions	10.7	13.2	20.2	9.1	2.4	19.3	-12.9	30.1	34.5
Insurance companies	-6.9	-3.4	31.1	26.3	25.1	40.9	-29.5	22.2	28.7
Variance ²	177.20	157.50	30.20	75.20	134.80	130.70	265.70	57.80	32.50
Overall tax rate	16.90	19.00	25.90	14.40	9.20	24.00	31.40	21.40	28.00

Source: Jorgensen (1993), Table 1-1 & Daly, Mercier and Schwetzer (1993), Table 3-5. Estimates assume a 5 percent expected annual inflation rate and real pre-tax return on net of depreciation on all investment projects at 10 percent.

1/ King and Fullerton's original work classified sectors by standard industrial classifications (SIC). The "other industry" group consists primarily of construction, transportation, communications, and utilities. The "commerce" sector includes nonfinancial services and distribution (King and Fullerton, 1984, p.13).

2/ This is the variance of the three values immediately above. It offers a measure of the dispersion of rates within each of the four main King-Fullerton categories.

Table 4. Canada: Marginal Effective Personal Tax Rates on Corporate Source Income
(In percent)

	Canada			United States			United Kingdom		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Industry¹									
Manufacturing	20.0	21.1	18.5	21.8	17.7	18.8	33.9	18.2	14.2
Other industry	18.4	19.3	18.4	23.3	19.8	19.4	29.8	18.3	14.6
Commerce	21.4	22.3	21.5	23.8	19.2	19.2	24.2	14.6	12.5
Variance ²	2.3	2.3	3.1	1.1	1.2	0.1	23.7	4.4	1.2
Asset									
Machinery	21.4	22.2	20.6	22.6	18.9	19.1	35.9	21.1	16.3
Buildings	18.1	19.1	17.7	22.6	18.8	19.1	23.1	13.9	11.0
Inventories	20.1	21.4	19.2	22.3	18.4	19.0	31.3	13.5	12.3
Variance ²	2.8	2.6	2.1	0.0	0.1	0.0	42.0	18.3	7.6
Source of Finance									
Debt	37.1	39.5	37.6	26.0	23.6	20.5	105.7	62.8	44.0
New shares	10.4	10.4	24.9	53.0	44.2	35.7	50.7	32.3	22.3
Retained earnings	8.4	8.3	4.4	18.2	14.0	17.0	10.6	4.8	5.6
Variance ²	256.8	304.1	280.6	333.5	238.1	98.8	2279.5	841.8	370.7
Owner									
Households	26.1	27.3	24.5	44.4	36.5	32.8	52.5	28.4	23.5
Tax-exempt institutions	0.0	0.0	0.0	-31.9	-25.3	-14.6	0.0	0.0	0.0
Insurance companies	-22.9	-22.9	-6.4	-17.2	-13.6	-7.9	32.3	21.4	14.5
Variance ²	601.1	631.6	266.0	1638.7	1077.7	658.0	701.3	218.9	140.6
Overall tax rate	20.0	20.9	19.3	22.5	18.7	19.1	30.7	17.2	13.8

Source: Jorgensen (1993), Table 1-2 & Daly, Mercier and Schwetzer (1993), Table 3-6. Estimates assume a 5 percent expected annual inflation rate and real pre-tax return on net of depreciation on all investment projects at 10 percent.

1/ King and Fullerton's original work classified sectors by standard industrial classifications (SIC). The "other industry" group consists primarily of construction, transportation, communications, and utilities. The "commerce" sector includes nonfinancial services and distribution (King and Fullerton, 1984, p.13).

2/ This is the variance of the three values immediately above. It offers a measure of the dispersion of rates within each of the four main King-Fullerton categories.

Table 5. Canada: Marginal Effective Tax Rates on Corporate Source Income
(In percent)

	Canada			United States			United Kingdom		
	1980	1985	1990	1980	1985	1990	1980	1985	1990
Industry ¹									
Manufacturing	28.2	29.9	38.5	48.2	40.3	46.4	-1.3	30.2	35.5
Other industry	39.3	42.1	42.1	12.8	6.4	28.8	12.8	30.1	32.7
Commerce	36.5	40.0	41.1	35.6	26.6	36.8	33.8	47.8	45.6
Variance ²	33.3	42.5	3.5	322.0	290.8	77.7	312.0	103.8	46.0
Asset									
Machinery	24.8	28.6	32.9	13.3	3.8	34.1	-7.0	16.8	23.0
Buildings	42.9	44.7	47.2	37.4	28.7	39.6	38.8	51.7	55.2
Inventories	36.6	37.4	44.0	44.4	41.8	40.3	7.8	54.0	47.2
Variance ²	84.4	65.0	56.3	266.2	372.6	11.5	546.3	434.5	281.1
Source of Finance									
Debt	21.4	27.1	33.7	-10.4	-18.8	8.8	114.7	49.1	35.1
New shares	50.5	50.9	60.3	75.1	68.2	64.1	20.5	25.5	25.5
Retained earnings	49.3	49.8	49.6	55.5	50.2	53.3	12.7	41.0	43.8
Variance ²	271.1	180.5	179.1	2006.2	2109.0	859.2	3223.1	143.8	83.8
Owner									
Households	40.3	42.7	44.8	53.2	42.5	48.7	30.9	39.1	41.2
Tax-exempt institutions	10.7	13.2	20.2	-19.9	-22.3	7.5	-12.9	30.1	34.5
Insurance companies	-31.4	-27.1	26.7	13.6	14.9	36.2	12.3	38.8	39.0
Variance ²	1298.2	1227.7	162.5	1339.0	1057.4	446.2	483.2	26.1	11.7
Overall tax rate	33.5	35.9	40.2	33.7	26.2	38.5	8.9	34.9	37.9

Source: Jorgensen (1993), Table 1-3. Estimates assume a 5 percent expected annual inflation rate and real pre-tax return on net of depreciation on all investment projects at 10 percent.

1/ King and Fullerton's original work classified sectors by standard industrial classifications (SIC). The "other industry" group consists primarily of construction, transportation, communications, and utilities. The "commerce" sector includes nonfinancial services and distribution (King and Fullerton, 1984, p.13).

2/ This is the variance of the three values immediately above. It offers a measure of the dispersion of rates within each of the four main King-Fullerton categories.

GENERAL GOVERNMENT TAX REVENUES

Sources: Statistics Canada; Bureau of Economic Analysis, U.S. Department of Commerce; and Fund staff estimates.

1/ Includes direct tax revenues of the Canada Pension Plan and the Quebec Pension Plan, and contributions for unemployment insurance and workers' compensation. Note, this is not a complete representation of payroll taxes.

FEDERAL GOVERNMENT TAX REVENUES

Sources: Statistics Canada; Bureau of Economic Analysis, U.S. Department of Commerce; and Fund staff estimates.

1/ Includes direct tax revenues of the Canada Pension Plan and contributions for unemployment insurance.
Note, this is not a complete representation of payroll taxes.

PROVINCIAL, STATE, AND LOCAL GOVERNMENT TAX REVENUES

Sources: Statistics Canada; Bureau of Economic Analysis, U.S. Department of Commerce; and Fund staff estimates.

1/ Includes direct tax revenues of the Quebec Pension Plan and contributions for workers' compensation.
Note, this is not a complete representation of payroll taxes.

CHART 4

CANADA AND OTHER G7 COUNTRIES TOTAL PAYROLL TAXES

Source: Organization for Economic Cooperation and Development (OECD), *Revenue Statistics of OECD Member Countries 1965-1994*, (1995 edition), table 14.

CHART 5

CANADA AND OTHER G7 COUNTRIES EMPLOYERS' CONTRIBUTION TO PAYROLL TAXES

Source: Organization for Economic Cooperation and Development (OECD), *Revenue Statistics of OECD Member Countries 1965-1994*, (1995 edition), table 18.

II. LABOR MARKETS IN CANADA¹

A. Introduction

1. Over the past 25 years, the unemployment rate in Canada has ratcheted up over successive business cycles. This paper looks at this development from various angles and examines the roles played by modifications to the unemployment insurance system, changes in unionization, demographic effects, and changes in the cost of labor in accounting for the rise in unemployment. The paper concludes with a discussion of the effects of changes in payroll taxes on unemployment.

2. Unemployment rates in Canada have risen across all demographic groups, industries and regions, although young and less-educated workers and workers in agriculture and primary industries have been most severely affected. In terms of aggregate factors, it appears that the rise in payroll taxes may have hindered employment opportunities. The empirical estimates suggest that the effects of an increase in payroll taxes on employment and unemployment are largely offset over a six-year period. Thus, successive increases in payroll taxes during the 1980s may have had a sustained impact on unemployment.

B. Labor Market Developments

3. The unemployment rate in Canada has ratcheted up from 6 percent in the early 1970s to around 10 percent currently. The rise in the unemployment rate in the 1970s and in the early 1980s was accompanied by a sharp increase in the participation rate, as women entered the labor force in large numbers (Chart 1). In the late 1980s, the participation rate declined initially reflecting cyclical influences and it has continued to fall despite a modest recovery in economic activity. The slow rise in the employment-population ratio since the late 1970s partly reflects the substitution of capital for labor. Since the late 1970s, there has been an upward trend in the capital-output ratio in Canada (controlling for cyclical effects) reflecting substitution of capital for labor to take advantage of the cost difference between both inputs (Chart 2). Since the early 1990s, the behavior of the employment-population ratio has been influenced by cyclical developments, falling during the 1990–91 recession and rising with the rebound in activity in 1994. The ratio has been essentially flat since then.

4. Following the decline in aggregate employment during the early 1990s, private sector employment has picked up. However, the aggregate employment increase has remained weak on account of more recent restructuring in the public sector. During 1993–95 and during the first 11 months of 1996, employment in the private sector grew by over 2 percent (per annum). In contrast, employment in the public sector declined by an annual average of

¹ Prepared by Alun Thomas.

1 percent over the 1993–95 period and declined further by 2 percent during the first 11 months of 1996.

5. The duration of unemployment also provides a measure of economic restructuring because it indicates changes in the number of core unemployed as opposed to workers who are temporarily unemployed. The mean duration of unemployment has risen from roughly 6 weeks during the 1970s to 24 weeks in the early 1990s (see Chart 1). In the early stages of a recovery, the mean duration of unemployment often declines as discouraged workers re-enter the labor force and commence their job search. However, this has not been the experience in Canada over the past two business cycles. Uncertainty about employment prospects may be reflected in the recent decline in the participation rate, particularly among youth (Chart 3). Poor employment opportunities and the recognition that education qualifications have a high financial payoff have encouraged youth to remain in school.

6. Although unemployment rates for all skill levels have risen since 1990, they have risen significantly less for individuals in the highest skill categories. As is the case in most industrialized countries, unemployment rates are inversely related to years of schooling, which is often used as a measure of skills (see tabulation below). In particular, the unemployment rate for workers with less than eight years of schooling is about three times that of workers with a college degree. Moreover, from 1990 to 1995, the average unemployment rate of workers who did not graduate from high school increased by 2½ percentage points, compared with a 1 percentage point increase in the unemployment rate of workers with a college degree.

Unemployment Rates by Education Levels

Education Level	1990	1991	1992	1993	1994	1995
Less than eight years	12.6	15.4	16.1	16.7	15.7	15.0
Some secondary	12.2	15.4	17.6	17.0	16.4	15.2
Secondary graduate	7.7	10.3	10.9	11.4	10.0	9.5
Some post-secondary	8.0	10.2	11.6	11.6	10.8	10.1
Post-secondary	6.3	8.2	9.4	9.5	8.9	7.9
University degree	3.7	4.9	5.5	5.7	5.4	4.9
Total	8.1	10.4	11.3	11.2	10.4	9.5

7. Over the past 25 years, there has been a secular decline in the employment shares of goods producing industries, particularly in the manufacturing sector. In 1970, the manufacturing sector accounted for 22 percent of total employment, but this ratio had fallen to 15 percent by 1995 (Chart 4). In contrast, the employment shares in service industries have

risen over time, with the most noticeable increase from 26 percent to 38 percent of total employment in community business and services. The unemployment rates in the manufacturing and services sectors have essentially remained trendless over the 1976–95 period, whereas the unemployment rates in agriculture and primary industries have experienced a secular rise of 2 percentage points.² The unemployment rate in the construction industry has also risen dramatically since 1989; however, this rise can be attributed to cyclical weakness in the industry.

8. The unemployment rates in the Atlantic provinces have remained consistently above the Canadian average over the past 25 years, whereas in all the other regions they have remained consistently below the average (Chart 5). However, with the exception of Newfoundland, there has been little change in relative unemployment rates over time in Canada. It appears that the introduction of regional extended unemployment benefits in the late 1970s has not appreciably affected the aggregate unemployment problem in Canada.³ Recent work by Corak and Jones (1995) argues that a major shift in the proportion of unemployment insurance recipients receiving regional extended unemployment benefits did not occur in the 1980s and that the number of beneficiaries of regional extended unemployment benefits is not more persistent than the number of other unemployment insurance beneficiaries.

9. It is possible, however, for the regional extended benefits system to affect economic behavior by reducing the incentives for inter-provincial migration. If workers know that their unemployment experience is cushioned by a longer duration of benefits, they are less likely to search for employment in other provinces. In Canada, data on inflows and outflows from each province are available for the working-age population. The data indicates that British Columbia and Alberta have been net recipients over the past 25 years, with average annual net migration rates of 0.8 and 0.4 percent, respectively. These provinces have gained potential labor force participants at the expense of Newfoundland, Québec, Manitoba, and Saskatchewan.

² The industry affiliation of each individual is defined as the industry of the last job held. Data on unemployment rates across industries are not available prior to 1976.

³ In 1977, the unemployment insurance system was amended to include a variable entrance requirement for benefits which depends on the local unemployment rate. Moreover, the criterion for the duration of regional extended benefits changed from the differential between the regional unemployment rate and the national rate to the differential between the regional unemployment rate and a threshold level. In June 1996, the Employment Insurance Act was passed incorporating changes to the calculation of benefits. This act legislated that beginning in July 1996, benefits would be based on earnings in the last 26 weeks prior to becoming unemployed divided by 14 to 22 depending on the unemployment rate in the claimant's region. Before the reform, claimants in areas of high unemployment could receive benefits based on average earnings over 12 weeks of work.

10. Changes to the regional extended benefits system in 1977 created considerable disincentives to search for employment across provinces. To determine whether a structural break in the net migration rate across provinces occurred following this change, a relationship for net migration using the panel of migration data for the provinces was estimated allowing for fixed effects for each province. Standard migration models assume that the decision to migrate depends on the relative return to work in the current and prospective region and on the likelihood of obtaining employment in both regions. The estimated equation included the relative real wage and the unemployment rate as explanatory variables and was used to test whether the responsiveness of migration to changes in these variables declined following changes to the regional extended unemployment benefits system in 1977.

11. The results in Table 1 indicate a significant positive relationship between the relative real wage and the net migration rate and a significant negative relationship between the relative unemployment rate and the net migration rate. Moreover, there is a significant decline in the responsiveness of migration to changes in relative wages and relative unemployment rates after 1977, suggesting that the changes made to the benefit criterion of the regional extended unemployment benefits system have adversely affected labor mobility.

12. The provision of regional extended unemployment benefits after 1977 was made dependent on the unemployment rate in a particular province relative to a threshold level of the unemployment rate. Therefore, during cyclical downturns, it is possible for the benefit system to affect aggregate migration without affecting net migration by reducing both inflows and outflows. To determine this disincentive effect of the system, it is necessary to aggregate inflows and outflows. Gross migration rates were calculated for each of the Canadian provinces by dividing each inflow and outflow by the donor populations and aggregating both ratios (Chart 6). Throughout the 1972–95 period, the gross migration propensities of the Atlantic Provinces have remained higher than the corresponding propensities for British Columbia, Ontario, and Québec. However, there has been a systematic decline in the gross migration rates of all the provinces over time which may be related to the aging of the population.

13. A comparison of the population weighted average gross migration rate with the aggregate unemployment rate in Chart 6 suggests that the gross migration behavior across provinces is pro-cyclical, contrary to the usual theoretical assumption that the relationship is counter-cyclical. Therefore, workers primarily move across provinces when the jobs climate is healthy.

14. To test for a structural break in the gross migration rate across provinces following the changes the regional extended unemployment benefits system, the gross migration rate was regressed on a segmented trend with a break in 1977, the aggregate unemployment rate, and province specific constants. The results in Table 2 indicate a significant negative relationship between the unemployment rate and the gross migration rate and a significant declining trend in the migration propensities of all the provinces since 1977. In particular, the

coefficient on the lagged unemployment rate indicates that a 5 percentage point rise in the unemployment rate leads to a 0.1 percent reduction in the gross migration rate. The significant declining trend coefficient since 1977 and the insignificant coefficient prior to this date indicate that a structural change took place at this time. Moreover, by 1995 this structural change had caused a 0.2 percent decline in the gross migration rate.

C. Factors Underlying the Rise in the Aggregate Unemployment Rate

15. The most common explanations for the rise in the aggregate unemployment rate over the past 25 years revolve around modifications to the unemployment insurance system, changes in unionization, demographic effects, and changes in the cost of labor (including changes in the minimum wage and payroll taxes).

16. The *generosity of unemployment insurance* affects the labor market in a number of ways. On the supply side, longer entitlement benefit periods are thought to increase the duration of unemployment by reducing the intensity with which the unemployed search for work. On the demand side, the absence in Canada of setting unemployment insurance charges for firms based on their use of the unemployment insurance system encourages them to rely on temporary layoffs rather than on changes in wages or hours worked in response to shocks. However, although the theoretical rationale for the existence of disincentive effects from a generous insurance system is clear, it has been difficult to find strong supporting empirical results.

17. Sargent (1995) has recently developed a new index of unemployment insurance generosity.³ Chart 7 plots the unemployment insurance (UI) index and the aggregate unemployment rate for Canada. The Chart clearly shows the sharp increase in unemployment insurance generosity in 1971–72 and the endogenous component of unemployment insurance generosity since the late 1970s, when eligibility requirements and duration were made dependent on the unemployment in a particular province relative to a fixed unemployment rate (the regional extended unemployment benefits system). Since the early 1990s the UI index has declined in response to successive reforms by the government and an improving economic climate; its current level is now comparable to the level prior to the major changes to the system in 1970.

18. *Unionization* can affect employment by preventing outsiders from bidding down wages in recessions. Using a generic model, Blanchard and Fischer (1989) demonstrate that

³ This index is based on an analysis of individual behavior at the kink points of an efficient income-unemployment frontier. The index is a nonlinear function of the minimum number of weeks needed to qualify for unemployment benefits, the duration of benefits for individuals who have satisfied the minimum eligibility requirement, and the replacement rate.

the greater the importance of unions in wage and employment decisions, the more persistent are the effects on unemployment of aggregate shocks to the economy. Riddell (1993) has examined the unionization experience in Canada and the United States since the mid-1960s. Over this period, the unionization rate in Canada rose from 30 percent in 1965 to 39 percent in the mid-1980s, after which it fell to 37 percent in 1995.⁵ In contrast, the unionization rate in the United States has declined from approximately 30 percent to 15 percent over the same period. Riddell argues that union density in Canada is approximately double that in the United States across a wide range of industries, occupations, and types of workers.

19. There is considerable debate at present about the effects of *minimum wages and payroll taxes* on employment. In particular, Card (1992) and Card and Krueger (1994) have argued that it is difficult to find any adverse effect of minimum wage increases on employment using microeconomic data. Neumark and Wascher (1995) argue that the absence of any effect on employment from minimum wages is the result of using samples in which minimum wages are binding for some individuals and not for others; isolating observations in which minimum wages are binding yields an adverse effect of minimum wages on the employment of teenagers and young adults. Moreover, Canadian studies generally find that unemployment rises as a result of a rise in the minimum wage relative to the average wage.

20. The debate about payroll taxes has focused on the adjustment of the labor market to changes in payroll taxes and the length of time required for this adjustment to take place. Theoretical models suggest that changes in payroll taxes eventually are borne by the employees so that over time effects on employment are expected to diminish. The payroll tax rate in Canada is usually defined as the ratio of supplementary labor income to total compensation. Supplementary income includes five major components: unemployment insurance premiums, Canada/Quebec Pension Plan contributions, private pension plan contributions, workers compensation, and various benefits under the umbrella of "welfare" benefits such as accident, health, and life insurance premiums. Beach, Lin, and Picot (1996) argue that employers' contributions to employees' private pension plans and the majority of welfare benefits are not proper payroll taxes because employers pay these benefits either on a voluntary basis or as a result of collective bargaining. Applying Beach et al.'s adjustment to the standard estimate of payroll taxes, indicates a fairly continuous rise in payroll taxes from 2 percent in the early 1960s to 11.6 percent in 1993. The expansion of unemployment insurance premiums is responsible for the largest share of the rise in the tax rate, accounting for 53 percent of the overall rate hike in the 1970s, 43 percent in the 1980s, and over three quarters since 1990.

⁵ The source for this measure of union density is the Directory of Labor Organization in Canada. The data made available under the Corporations and Labour Union Return Act indicates that union density has risen more moderately over the same period.

21. A number of studies have attempted to derive empirical estimates of the effects of all of the above factors on the unemployment rate in Canada. According to Coe (1990), the increase in the generosity of the unemployment insurance system in the early 1970s caused a rise of 1 percentage point in the natural rate of unemployment over the 1970–88 period. This was offset by a decline in the minimum wage relative to the average wage. However, a rise in unionization and in payroll taxes caused a further 1 and 2½ percentage point increase, respectively, in the natural rate. Sargent and Sheikh (1996) also find that movements in the natural rate are driven by changes in unionization and Côté and Hostland (1996) argue that unionization and payroll taxes are the only variables that cointegrate with the unemployment rate. In Cole et al. (1995) the rise in the unionization rate accounts for roughly 2 percentage points of the rise in the unemployment rate since the early 1970s. Moreover, this effect is insensitive to the inclusion or exclusion of the level of the payroll tax rate. In contrast, Fortin, Keil and Symons (1995) in an analysis of Canadian regions and demographic groups over the 1966–93 period, find no significant effect on unemployment from unionization and argue that the effect of taxation is only temporary because changes in taxation are expected to be borne by the employees in the long run. They find that the rise in unemployment is associated with changes in demographic pressure and a more generous unemployment insurance system which more than offset the effects of the decline in the minimum wage relative to the average wage.

22. In a recent paper, Prasad and Thomas (1996) use Sargent's UI index in a simple empirical model of the labor market to determine whether the generosity of the unemployment insurance system prolongs labor market adjustment in Canada. They find that the quantitative impact of the endogenous component of the unemployment insurance system does not have a large effect on the persistence of aggregate unemployment. Moreover, although the noncyclical component of unemployment insurance has played an important role in increasing unemployment over the 1970s and 1980s, it cannot explain in isolation the continued high level of unemployment, since the generosity of the unemployment insurance system has now fallen to levels experienced prior to the rise in structural unemployment. However, it is possible that other factors may have overshadowed the effects of the generosity of the unemployment insurance system over the recent period.

D. An Empirical Model of the Labor Market

23. There is considerable discussion about the impact of payroll taxation on the labor market in Canada, as well as in many other OECD countries, and there is no clear consensus about the duration of the impact. For example, in the studies on Canada discussed above, the importance attached to payroll taxes in explaining unemployment varies considerably. A drawback of a number of these studies is that they relate the unemployment rate to the payroll tax rate, and, therefore, ignore how the effects of changes in payroll taxation on unemployment are transmitted through changes in gross wages. The purpose of this section is to estimate a labor market model that incorporates the transmission of changes in payroll taxes into wages and, subsequently, into changes in employment and unemployment. This will help

to determine the extent and the speed with which changes in payroll taxation are absorbed by workers.

24. In labor market models which allow for unemployment in equilibrium, the extent to which a change in payroll taxes leads to a change in employment depends on the wage setting process. Under the assumption that wages are determined in a union bargaining framework, an upward sloping wage-setting curve can be generated. This wage-setting curve, combined with a downward sloping labor demand curve and an upward sloping labor-supply curve, defines a labor market model with unemployment. Figure 1 presents a graphical depiction of such a labor market prior to and following a rise in payroll taxes. The initial equilibrium is at A with unemployment $L_{u0} - L_{e0}$. In response to a rise in payroll taxes, firms will hire less labor at the initial net wage W_0 because gross wage costs to the firm will have risen by the amount of the tax. The resulting short-run equilibrium at B at the intersection of LD_1 and WS_0 is characterized by a slight reduction in the net wage to make workers more attractive to firms. However, this does not represent a long-run equilibrium because over time unemployed workers are expected to bid down wages further. For example, the wage-setting locus may shift downwards from WS_0 to WS_1 leading to a new equilibrium at C. The relative importance of the unionized employees versus the unemployed workers in the wage setting process is a key factor in determining the ultimate degree of wage adjustment and the extent to which a rise in payroll taxes reduces employment.

25. The degree of wage adjustment also affects labor supply decisions because the decline in the net wage received by employees generated by a rise in payroll taxes will lead to a reduction in the labor force. For example, labor supply at the long-run equilibrium C is lower than at the initial equilibrium A. Therefore the extent to which a rise in payroll taxes affects unemployment depends both on the behavior of labor demand and supply.

Figure 1. Canada: The Labor Market

The estimated labor demand function comparable to LD_0 is as follows:

$$E = \zeta(W, PTY) \quad (1)$$

where E is employment, W is the aggregate real wage per hour worked inclusive of payroll taxes, and PTY is aggregate labor productivity per hour worked. The productivity variable is included in the specification because in the standard production function with labor and capital as the factors, the firm's choice of whether to increase employment depends on the capital stock (or, equivalently on labor productivity), as well as the real gross wage.

26. The wage-setting equation is an upward sloping relationship between the level of real wages and employment, with labor productivity and payroll taxes included to proxy productivity developments and to isolate the effects of taxes, respectively.

$$W = \xi(PTY, \tau, E) \quad (2)$$

where τ is the payroll tax rate.

27. The labor supply equation is an upward sloping relationship between the level of net wages and the participation rate. It also includes the child dependency ratio and a time trend to account for the rise in the participation rate over the past 25 years as women entered the labor force in greater numbers. The child-dependency ratio proxies the facility with which women were able to enter the labor force, and the time trend proxies improvements in the skill level of women.

$$PR = \psi(W(1-\tau), child-dep, t) \quad (3)$$

where PR is the labor force participation rate, $child-dep$ is the ratio of working-age females to the total working-age population, and t is a time trend.

28. The above equations were estimated using annual data over the period 1966 to 1993. The starting point for the data was constrained by the availability of employment data, whereas the end point was constrained by the availability of the modified payroll tax rate calculated by Beach et al. (1996).⁶ Weighted Symmetric t test statistics indicate that all of the above variables with the exception of the child-dependency ratio, have trended upwards over time, and therefore, it is necessary to consider the extent to which the relationships are cointegrated (Table 3 provides statistics on the stationarity of the data series). Cointegration tests based on the Johansen methodology indicated that labor demand, wage-setting, and labor supply equation each generated one cointegrating vector (Table 4). Moreover, the labor demand and wage setting curves were properly identified as downward and upward sloping relationships between the real wage and employment, respectively.

29. The existence of cointegrating vectors in the three relationships allows the equations to be specified in log levels because they can be reparameterized in log levels and log differences so that all elements on both sides of the equations are stationary (see Ericsson (1995) for a discussion of this issue).

$$E_t = a_0 + \sum_{i=1}^n b_i E_{t-i} + \sum_{i=1}^n c_i W_{t-i} + \sum_{i=1}^n d_i PTY_{t-i} + \epsilon_t \quad (4)$$

⁶ Dummies were included because of a break in the employment data in 1975.

$$W_t = \sum_{i=1}^n f_i W_{t-i} + \sum_{i=1}^n g_i PTY_{t-i} + \sum_{i=0}^n h_i \tau_{t-i} + \sum_{i=1}^n i_i E_{t-i} + \epsilon_t \quad (5)$$

$$PR_t = \sum_{i=1}^n k_i PR_{t-i} + \sum_{i=1}^n l_i W(1-\tau)_{t-i} + \sum_{i=0}^n m_i child-dep_{t-i} + \epsilon_t \quad (6)$$

30. The main focus in this paper is in estimating the effects on the labor market of changes in the payroll tax rate. In the model above the payroll tax rate enters directly into the wage-setting equation, which then feeds into changes in employment and in the participation rate. In order to determine the effects of changes in the payroll tax rate, a dynamic equation was specified for payroll taxes. This equation relates changes in the payroll tax rate to lagged changes in the tax rate and to the lagged change in employment. The change in employment captures the fact that until recently, the employment insurance component of the payroll tax rate depended on the business cycle.⁷

$$\Delta \tau_t = \sum_{i=1}^n p_i \Delta \tau_{t-i} + q_1 \Delta E_{t-1} + \epsilon_t \quad (7)$$

31. In the wage-setting equation, the two lags of the dependent variable, the first lag on productivity, and the second lag on employment are the only significant variables.⁸ Moreover, with the exception of the wage variable, the coefficients on the various lags (for a given

⁷ In early 1996 new legislation decoupled the link between the payroll tax rate and the business cycle. To capture this recent change in determining the payroll tax rate, feedback effects from changes in employment to the payroll tax rate are ignored in the simulations presented below.

⁸ The choice of lag length for estimation purposes is always a subjective issue. In this paper each equation was estimated with two lags for each variable. This choice was based on averaging the variety of optimal lag lengths identified by the Schwarz-Bayes and Akaike criterion for the system of equations (Table 5). In an OLS regression of nonstationary variables the standard estimate of the variance-covariance matrix is invalid because the off-diagonal elements are nonzero. Therefore it is necessary to use a Generalized Method of Moments estimator which eliminates the autocorrelations on the off-diagonal of the variance-covariance matrix. Table 6 presents the estimated coefficients of the system and indicates statistical inference based on t-statistics corrected for autocorrelation.

variable) offset each other. In particular, changes in payroll taxes raise the gross wage considerably in the first two years, but this increase is reversed in the following year. In the labor demand equation, the first lags of employment and the real wage are significant, together with the second lag on labor productivity. The sum of the two coefficients on the real wage is small, however, suggesting that employment only responds weakly to changes in the real wage. In the equation for the labor force participation rate, both lags of the dependent variable are significant, whereas the coefficients on net wages are insignificant and very small in magnitude. In the payroll tax equation, the lagged change in employment is significantly negatively related to the payroll tax rate. Moreover, the lagged coefficients of the dependent variable are all negative, so that an initial positive shock to payroll taxes is muted over time although it remains positive.

32. To trace the dynamic path of the variables in response to changes in payroll taxes, it is useful to examine impulse response functions computed using the coefficient estimates and corresponding confidence intervals based on replications of Monte-Carlo simulations.⁹ The panels in Chart 8 show the impulse response functions and corresponding confidence intervals for the levels of employment, the real gross wage, the payroll tax rate, and the participation rate in response to a 1 percentage point rise in the payroll tax rate. The shock to the payroll tax rate is permanent, although it declines gradually over time to a 0.6 percentage point increase. The effect of the rise of the payroll tax rate on the gross wage is immediate,¹⁰ and within one year the gross wage increases by the amount of the tax increase. Over time, the effect of the tax on the gross wage gradually weakens and is eliminated by the fifth year following the shock.

33. The initial sharp rise in the gross wage generates a 0.3 percent decline in the level of employment after three years which is subsequently eliminated as the gross wage returns to its initial level. The initial decline in employment is comparable to recent estimates obtained by other authors. In particular, Parker (1995) suggests that a 1 percentage point rise in the payroll tax rate leads to a reduction in employment of 0.3 percentage point, whereas Scarth estimates the effect to be slightly lower at 0.15 percentage point. A discussion paper published by the Canadian Department of Finance has a comparable estimate of the long-term employment effects (Weldon, 1993).

34. The studies of Parker (1995), Scarth (1994), and Weldon (1993) assume that the effect of changes in payroll taxes on employment is permanent, whereas this study suggests that changes in payroll taxes are largely shifted to the employee over a six-year period. However, if shocks to payroll taxes occur more than once in a six-year period, this would

⁹ One thousand replications were conducted and averaged. The coefficient estimates in the payroll tax equation were converted into level effects to maintain consistency with the other equation specifications.

¹⁰ This is because of the assumption that it enters contemporaneously into the wage equation.

have the effect of ratcheting up the effect of payroll taxes on employment over time. Over the period 1966–93 changes in payroll taxes were positive in all years except for the early and late 1970s and for 1989.

35. Changes in payroll taxes also affect the supply of labor. In order to determine its effects on the unemployment rate, it is necessary to consider the impact of payroll taxes on the participation rate. The impulse response for the participation rate was derived by calculating an impulse response for the net wage based on the profiles of the payroll tax and the gross wage and feeding the resulting net wage profile through the coefficient estimates of the participation rate equation. This procedure indicates that the participation rate rises slightly in the first few years in response to the short-run increase in the net wage but changes little over the long run.

36. The net effect on the unemployment rate of changes in employment and in the participation rate can be derived by assuming that the population is fixed and using the following identity between employment, the participation rate, population, and the unemployment rate.

$$U = 1 - \left(\frac{E}{POP.PR} \right) \quad (8)$$

where POP is the population.

37. The resulting impulse response profile for the unemployment rate indicates that the effect on the unemployment rate peaks at 0.4 percentage point four years following the shock to payroll taxes but that the effect subsides six years following the shock (Chart 8). This is comparable to the effect obtained by Tyrvaenen (1995) that a 1 percentage point rise in the payroll tax rate causes a 0.3 percentage point rise in the unemployment rate.

38. The above discussion has focussed on the effects on the labor market of an increase in payroll taxes, and the question arises whether these effects are symmetric. According to the empirical model developed above the effects of the rise in payroll taxes on the net wage over the first few periods is negligible because the gross wage rises by the amount of the increase in payroll taxes. However, over time the gross wage returns to its initial level and the net wage falls correspondingly.

39. It is not possible to isolate whether there are short-run asymmetric effects between payroll tax increases and decreases in Canada because payroll taxes have risen almost continuously over the 1966–93 period. However, Kesselman (1996) argues that reducing employer payroll taxes may yield much less boost to employment than the employment lost from a comparable size of tax increase. This is because there is much less resistance to wage hikes than wage cuts, making the adjustment process more rapid for the former. Moreover, Gruber (1995) has found in analyzing a recent large discrete cut in employer tax rates in Chile that the entirety of the cut was reflected quickly in higher gross pay for employees.

40. Overall, the empirical results presented in this paper should not be taken as conclusive. They primarily serve to illustrate the possible impacts of changes in payroll taxes and point the way for further empirical work on the structure of the labor market in Canada. In particular, pooling labor market data for all the provinces would be a useful test of the robustness of the results presented above.

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Table 1. Canada: Determinants of Net Migration Across Canadian Provinces 1/

Variables with the same coefficient across provinces		
Relative wage	0.04	*
Relative wage (1977-94)	-0.026	*
Relative Unemployment rate	-0.20	*
Relative Unemployment rate (1977-94)	0.07	*
Net migration (-1)	0.84	*
Net migration (-2)	-0.20	*
Youth population share	0.26	*
Provincial fixed effects		
Newfoundland	-0.23	*
Nova Scotia	-0.04	
New Brunswick	-0.08	
Quebec	-0.13	*
Ontario	-0.02	
Manitoba	-0.28	*
Saskatchewan	-0.27	*
Alberta	0.08	
British Columbia	0.19	*

1/ An asterisk denotes a variable or test statistic that is significant at the 10 percent level.

Table 2. Canada: Determinants of Gross Migration Across Canadian Provinces 1/

Variables with the same coefficient across provinces		
1972-76 trend	0.003	
1977-94 trend	-0.009	*
Unemployment rate	-0.02	*
Gross migration (-1)	0.68	*
Provincial fixed effects		
Newfoundland	1.05	*
Nova Scotia	1.07	*
New Brunswick	1.00	*
Quebec	0.53	*
Ontario	0.75	*
Manitoba	1.10	*
Saskatchewan	1.18	*
Alberta	1.26	*
British Columbia	0.90	*

1/ An asterisk denotes a variable or test statistic that is significant at the 10 percent level.

Table 3. Canada: Unit Root Tests 1/

Variable	Weighted Symmetric τ Test	Dickey-Fuller τ Test
emp	-0.7	-0.7
Δ emp	-3.3 *	-2.2
real wage	-0.2	-4.2 *
Δ real wage	-2.8	-1.2
prod	-0.5	-7.8 *
Δ prod	-2.9	-7.2 *
ptax	-1.4	1.5
Δ ptax	-3.4 *	-1.3
partr	-0.2	-0.1
Δ partr	-2.7	-1.6
child-dep	-3.4 *	-8.0 *
Δ child-dep	-2.9	-2.2

1/ See text for data definitions. The Weighted Symmetric τ test involves a weighted double-length regression in which the dependent variable is regressed on leads and lags of its own changes. See Pantula (1994) for more details. The Dickey-Fuller τ test involves regressing the dependent variable on its own lags and its own lag level; asymptotic probability values for the DF τ test were obtained from Mackinnon (1994). An asterisk denotes significance at the 10 percent level.

Table 4. Canada: Johansen Maximum Likelihood Tests of the System of Equations

(Cointegration likelihood ratio test based on trace of the stochastic matrix)

Null	Alternative	Test Statistic	95 Percent Critical Value
Wage Setting Equation			
$r=0$	$r \geq 1$	49.8	48.3
$r \leq 1$	$r \geq 2$	23.1	31.5
$r \leq 2$	$r \geq 3$	7.1	18.0
$r \leq 3$	$r \geq 4$	2.6	8.2
Labor Demand Equation			
$r=0$	$r \geq 1$	32.5	31.5
$r \leq 1$	$r \geq 2$	13.6	18.0
$r \leq 2$	$r \geq 3$	4.0	8.2
Participation Rate Equation			
$r=0$	$r \geq 1$	32.3	31.5
$r \leq 1$	$r \geq 2$	17.8	18.0
$r \leq 2$	$r \geq 3$	5.4	8.2

Table 5. Canada: Criteria for Selecting Lag Length

Model Criteria	Number of Lags		
	1	2	3
Labor demand equation:			
Akaike	-5.6	-5.6	-5.8
Schwarz	-8.2	-8.1	-8.1
Wage setting equation:			
Akaike	-5.3	-5.3	-6.1
Schwarz	-7.7	-7.5	-8.2
Labor supply equation:			
Akaike	-7.9	-8.3	-8.1
Schwarz	-10.4	-10.7	-10.4

Table 6. Labor Market Model 1/

	Dependent Variable			
	Real Wage	Employment	Participation Rate	Payroll Tax
W (-1)	1.26 *	-0.19 *		
W (-2)	-0.46 *	-0.01		
W(1- τ)(-1)			-0.02	
W(1- τ)(-2)			0.02	
E (-1)	0.21	0.56 *		
E (-2)	-0.21 *	-0.14		
PTY (-1)	-0.45 *	0.10		
PTY (-2)	0.53	0.79 *		
τ	0.46			
τ (-1)	0.49			
τ (-2)	-1.04			
PR (-1)			1.20 *	
PR (-2)			-0.81 *	
Child-dep			-0.08	
Child-dep (-1)			0.32	
Child-dep (-2)			-0.34	
$\Delta\tau$ (-1)				-0.26
$\Delta\tau$ (-2)				-0.06
$\Delta\tau$ (-3)				-0.14
$\Delta\tau$ (-4)				-0.17
ΔE (-1)				-0.12 *
Goodness of Fit Statistics				
R ²	0.98	0.99	0.99	0.34
Autocorrelation test	14.5	14.65	16.8	

1/ An asterisk denotes a variable or test statistic that is significant at the 10 percent level.

COMPONENTS OF THE UNEMPLOYMENT RATE

Sources: Statistics Canada; and Fund staff estimates.

THE CAPITAL-OUTPUT RATIO AND RELATIVE COST OF CAPITAL

Sources: Statistics Canada; Data Resources Inc.; and Fund staff estimates.

1/ Real user cost of capital minus real wage.

CANADA

PARTICIPATION AND UNEMPLOYMENT RATES BY AGE AND SEX 1/

Source: Statistics Canada.

1/ Shaded areas indicate recessions.

CANADA
EMPLOYMENT AND UNEMPLOYMENT BY INDUSTRY

Source: Statistics Canada.

PROVINCIAL UNEMPLOYMENT RATES

Source: Statistics Canada.

CANADA
POPULATION MIGRATION AND UNEMPLOYMENT

Source: Statistics Canada.

CHART 7

CANADA

UNEMPLOYMENT INSURANCE INDEX AND THE UNEMPLOYMENT RATE

Sources: Statistics Canada; and Sargent (1995).

IMPULSE RESPONSES TO PAYROLL TAX SHOCK 1/

Sources: Statistics Canada; and Fund staff estimates.

1/ The shock is a one percent increase in the payroll tax rate.

2/ The upper and lower bounds of a 95 percent confidence interval are included.

III. THE CANADIAN PENSION PLAN REFORM: ANALYTICAL CONSIDERATIONS¹

A. Introduction

1. Like other transfer programs, a pay-as-you-go (PAYG) public pension system can have significant effects on economic behavior, and hence on relative prices and macro-economic aggregates.² This paper illustrates some of these effects, which are important in weighing various options for the reform of public pensions, in the context of a stylized dynamic general-equilibrium model of life-cycle behavior.³ The analysis shows that the introduction of a public pension system can reduce aggregate saving, income, and wages and increase interest rates. It also shows that a significant part of the distortion caused by a public pension plan can result from the fact that benefits are not explicitly linked to contributions, and that creating such a linkage can reduce the distortions associated with the wage tax that funds the contributions to the plan.

2. The issue is timely, as reforms of the pension systems in a number of countries are now being considered. Over the postwar period, many countries have experienced dramatic changes in demographic and economic trends, particularly changes in fertility rates, wage growth, and interest rates. These changes have important implications for the soundness of PAYG pension schemes, which transfer funds from workers to retirees using a payroll tax. When there are many workers per retiree and wages are high, such plans thrive, as the base for contributions is large enough to fund generous benefits using a low payroll tax. Indeed, the postwar "baby-booms" in countries like Canada meant a substantial rise in the number of workers per retiree in the early years of the boom, making room for generous pension plans. Now the same workers whose numbers permitted this generosity are themselves approaching retirement. However, members of the baby-boom generation have fewer children per household than their parents did, and their parents are living longer lives than earlier generations did. As a result, the number of workers per retiree has been declining, and is expected to decline further as the baby boomers retire. The consequences for public pensions are clear. Either the baby-boom generation will face much lower retirement benefits than its parents did, or its children will pay sharply higher taxes.

¹ Prepared by Charles Kramer and Yutong Li.

² Public pension schemes also serve as a kind of insurance (James (1996)), although this function is not discussed in this paper.

³ This paper focuses on theoretical issues in the context of a specific model. Other models and empirical evidence can provide other views. For a broader overview of relevant issues, including from a multi-country perspective, see SM/96/7, SM/96/8, SM/96/10, and SM/96/11, and Roseveare and others (1996).

3. Major demographic and economic changes are putting the finances of the Canada Pension Plan (CPP) at risk. As a response, a number of proposals for reforms of the CPP are currently under consideration. This paper considers the effects that public pension schemes may have on economic aggregates, wages, and interest rates. The first half of the paper discusses some details of the CPP and describes some of the reform options that have been proposed. The second half examines some of the economic effects of public pension plans in general and simulates the economic effects of changes in provisions of pension plans using the computable general equilibrium model of Auerbach and Kotlikoff (1987). The final section draws some conclusions.

B. The Canada Pension Plan: Provisions and Issues

4. Canada's retirement income system has three main parts. The first part is wage related, and is financed by compulsory payroll taxes contributed by employees between the ages of 18 and 70 and their employers. This part of the pension plan is comprised of the CPP and the Quebec Pension Plan (QPP).⁴ The CPP began operation in 1966. It is an important component of the Canadian old age support system as it provides benefits upon retirement, disability or the death of a contributor.⁵ The second part is funded out of general revenues and includes the Old Age Security (OAS) and Guaranteed Income Supplement (GIS) programs.⁶ The third part is private retirement saving that is encouraged by incentives such as deferral of the taxes on contributions and income earned on them before retirement. Vehicles for private retirement savings include employer-sponsored pension plans and Registered Retirement Savings Plans (RRSPs).⁷ This paper will focus on the wage-related components of public old age support,

⁴ Quebec has its own pension plan, which is separate from the CPP. However, its pensions are essentially identical to those of the CPP, so nothing is lost by focusing on the CPP.

⁵ This paper will focus on CPP retirement pensions. More detailed information about other benefits provisions of the CPP is available in Office of the Superintendent of Financial Institutions (1995).

⁶ OAS is the basic public pension benefit for senior citizens in Canada, with a currently uniform benefit of \$385 per month being paid to all pensioners. The GIS provides additional financial assistance to single pensioners with annual income below \$11,000 or married couples with annual income below \$14,500. In the 1996 budget, the federal government announced that OAS/GIS benefits will be combined into a new single benefit program (the Seniors Benefit) with stricter means-testing, starting in 2001.

⁷ See *Canada - Recent Developments and Policies* (1995), and Venti and Wise (1994).

namely the CPP. Therefore, the operation of the CPP system will be explained in detail.⁸ The main provisions of the plan are summarized in the tabulation below.

5. A Canadian aged 60 or older is eligible for a CPP retirement pension provided that he or she has made contributions for at least one calendar year during his or her working life. Once a person reaches age 70, he or she can no longer contribute to the plan. Canadians are entitled to a full pension at age 65. Those retiring before age 65 face a reduction in benefits of ½ percent for each month of early retirement; those retiring after age 65 receive an increase in pension benefits of ½ percent for each month of late retirement up to 70 years of age. After retirement, pension benefits are fully indexed to inflation as measured by the consumer price index (CPI). Retirees do not contribute to the CPP. The maximum pension benefit at age 65 was \$8,725 in 1996.

Provisions of the CPP in 1996 ⁹	
Age for eligibility for CPP benefits	age 60
Age for full pension	age 65
Maximum age for contribution	age 70
Maximum pension benefit at age 65	\$8,725
Year's maximum pensionable earnings	\$35,400
Year's basic exemption	\$3,500
Replacement rate	25 percent
Drop-out provision	15 percent (up to 7 years)
Contribution rate	5.6 percent

6. Workers and employers contribute to the plan a fraction of wage income between a maximum value and a basic exemption. The fraction of wages contributed is known as the *contribution rate*; the maximum income is known as the *year's maximum pensionable earnings* (YMPE); and the minimum is known as the *year's basic exemption* (YBE). The YMPE rises each year in proportion to the rise in average earnings (the industrial aggregate calculated by Statistics Canada), but remains constant if average earnings decline. Benefits on retirement are 25 percent (the *replacement rate*) of average monthly pensionable earnings below the YMPE. When average pensionable earnings are calculated in order to determine

⁸ For detailed information with regard to how the other parts of the Canadian pension system work, please see *Canada - Recent Developments and Policies 1996*, and *Canada - Recent Developments and Policies 1994*.

⁹ Effective January 1, 1997, the CPP contribution rate was increased to 5.85 percent. The maximum pensionable earnings were increased by \$400 to \$35,800 and the basic exemption was left unchanged at \$3,500.

benefits, the contributor can drop from his or her earning record 15 percent of nonworking or low-income years between age 18 and 65, up to 7 years. This is known as the *drop-out provision*, and the period of time that can be dropped from the earnings record is known as the *drop-out period*. The YBE is about 10 percent of the YMPE; in 1996, the YMPE was \$35,400, and the YBE was \$3,500.¹⁰ The contribution rate in 1996 was 5.6 percent of wages, split equally between employees and employers (the self-employed pay the full contribution).

7. The CPP operates on a PAYG basis, with a balance maintained in the CPP account equivalent to two times the level of annual benefit payments. To ensure the sustainability of the plan, the schedule of contribution rates is reviewed every five years by federal and provincial finance ministers. Since past and current contributions were made at rates that were below the actuarially fair rate (estimated at about 10 percent), the CPP faces a large unfunded liability.¹¹ For the CPP, this liability is estimated at about \$500–550 billion, equivalent to 70 percent of GDP, and it would grow by about \$50 billion per year under the current schedule of contribution rates. This liability has arisen because costs have grown more rapidly than expected at the plan's inception. The major reasons for the rise in costs include a higher-than-expected ratio of retirees to workers because of lower birth rates and longer life expectancy; slower-than-expected growth in real wages; enrichment of benefits; and the recent steep rise in disability expenditures (Chart 1 and Chart 2). The plan will experience additional financial pressures when the baby-boom generation begins to retire around 2011. According to the CPP's most recent actuarial report, the elderly dependency ratio is projected to rise from 21 percent in 2000 to 34 percent in 2025.¹²

8. As a result, the provisions of the CPP will need to change in order to finance the unfunded liability and maintain funds to pay pensioners. In fact, the contribution rate has already been legislated to increase from 5.6 percent in 1996 to 7.9 percent in 2005 and to 9.9 percent in 2015 (Chart 3). Despite the scheduled increases in contribution rates over the next 20 years, in the absence of additional changes to the current legislation, the CPP fund assets (currently about \$40 billion) are projected to be exhausted in 2015. Based on the

¹⁰ The maximum pension is less than 25 percent of the current YMPE, as the maximum pension is based on current and past earnings, whereas the current YMPE is based on current earnings.

¹¹ The unfunded liability is defined as follows. If the contribution rate were immediately increased to the actuarially fair rate, an amount equal to the unfunded liability would have to be added to the CPP's assets in order to cover future expenses over the medium term, absent further increases in contribution rates or reductions in benefits (Office of the Superintendent of Financial Institutions (1995) and Department of Finance (1996a)).

¹² The elderly dependency ratio is defined as the number of persons aged 65 years and over divided by the number of persons between the ages of 20 and 64. (Office of the Superintendent of Financial Institutions (1995)).

benchmark calculations reported in the CPP's *Fifteenth Actuarial Report*, in order to maintain assets at about twice annual expenditures without other measures, the contribution rate will have to increase from 5.6 percent in 1996 to 8.9 percent in 2005 and to 11.6 percent in 2015, with even higher rates (up to about 14 percent) needed in subsequent years.

C. Options for Reform

9. Consultations among the Canadian Government, the provincial governments, and the public about how to reform the CPP began in 1996. Changes to the CPP have to be approved by the federal government and two-thirds of the governments of the provinces representing two-thirds of the population. As of late 1996, there was general agreement between the federal government and the provinces on a phased increase in contribution rates as a major element in any reform plan. Proposals for additional reforms focus on measures to reduce the costs of the CPP. The measures include administrative streamlining and cuts in retirement, disability, and survivor benefits.¹³

10. One measure would be to *reduce administrative costs*. Such reforms are already underway. The federal government is redesigning the administration of its income security programs, including the CPP. The new system is expected to be in place in 1997. The redesign will save the government about \$1.3 billion over the first 15 years and provide better service to seniors at the same time.

11. A second group of measures would *reduce CPP retirement benefits* to offset the increase in life expectancy since the plan's inception. Four main options are being considered in this regard. The first option is to lower the replacement rate for new pensioners from 25 percent to 22.5 percent. The second option is to reduce the drop-out period from a maximum of seven years to a maximum of about five years (e.g., from 15 percent of the earnings period to 10 percent). Reducing the drop-out period would in effect decrease benefits and remove some of the insurance component of the plan. The third option is to raise the retirement age by two years from 65 to 67. The fourth option is to index CPP benefits to CPI inflation less 1 percentage point, rather than to CPI inflation, to reflect measurement bias in the CPI.

12. A third group of reform measures would *reduce disability benefits*. Disability expenditure has more than doubled between 1987 and 1994 because of an increase in the number of claimants and the average duration of disability benefits granted. The first option is to address overlap between the CPP disability program and Workers' Compensation programs. It would subtract 25 percent of the Workers' Compensation that a disabled person receives from CPP disability benefits. The second option is to tighten eligibility requirements

¹³ Department of Finance (1996a) and (1996b) contain further details on the proposals. The focus here is on the options that have the largest expected savings.

by requiring workers to contribute to the CPP for a longer period of time before they can be eligible for disability benefits. The third option is to reduce the retirement pension paid to the disabled. One such proposal is to give the disabled the same pensions as early retirees; another is to base retirement earnings on average earnings at the time of disability, rather than on average earnings at age 65.

13. A fourth reform measure would *seek higher rates of return on the CPP's assets*. Currently, some of the CPP's assets are lent to the provinces at the interest rate prevailing on federal long-term bonds (which represents an effective interest-rate subsidy for the provinces); the remainder is invested in federal government securities. At present, since the CPP's asset base is fairly small, this is not of great consequence. However, if assets in the plan are to be built up through increases in contribution rates, as is generally agreed should be done, the cost of on-lending the funds to the provinces may be substantial. For example, if the balance in the CPP were carried at a higher level than the two years of benefits at present and if these funds earned rates of return like those earned on private pension assets, the long-term contribution rate required to sustain the financial viability of the plan could be reduced from around 14 percent to about 12.2 percent.¹⁴

14. The tabulation below shows the effects that various reforms would have on the CPP's finances in terms of the equivalent change in the contribution rate. These calculations make it clear that marginal reforms will be insufficient to ensure the CPP's viability in the long run.

Financial Impact of Possible CPP Measures¹⁵		
	Savings in 2030	
	As a Percent of CPP Expenditures	As a Reduction in Pay-As-You-Go Contribution Rate (percent of pensionable earnings)
<i>Retirement benefits</i>		
Reduce income replacement rate to 22.5 percent	8.8	1.25
Reduce drop-out to 10 percent over 5 years	2.2	0.31
Raise age of entitlement to 67	4.2	0.63
Index benefits in pay by CPI minus 1 percent	9.0	1.28
<i>Disability benefits</i>		
Lower benefit by 25 percent of Worker's Compensation	0.6	0.08
Tighten eligibility requirement	1.2	0.39
Convert pension at age 65 actuarially reduced pension	2.7	0.39
Base retirement pensions on pensionable earnings at disability	1.1	0.15

¹⁴ Department of Finance (1996a), p. 24.

¹⁵ Department of Finance (1996b).

D. The Economics of Public Pension Systems

15. This section reviews some of the economics of public pension systems before proceeding to describe the simulations in detail. The discussion is intentionally brief, more details are available in Blanchard and Fischer (1994) and Auerbach and Kotlikoff (1987). Related work that focuses on Canada in particular includes Bayoumi (1994) and James and others (1995).

16. The simulations presented in subsequent sections are derived from a dynamic general equilibrium model with endogenous prices and quantities. However, in order to illustrate the relevant issues in a simple fashion, the discussion in this section focuses on the steady state properties of a simple dynamic economy. Also, for the moment it is assumed that wages and interest rates are exogenous.¹⁶ Consider an economy consisting of two generations of households, young and old. The number of young households grows each period at the rate n . Assume that the young supply one unit of labor inelastically, earning wage W and consuming an amount C_y . The labor income that the young do not consume is saved in assets (A) that accrue interest at rate r . Old households do not supply labor, but only consume their assets $(1+r)A$, so that consumption when old, $C_o = A(1+r)$. Since lifetime income is just the wage earned when young, each household faces the lifetime budget constraint (expressed in terms of resources when young in period t)

$$C_{y,t} + \frac{C_{o,t}}{1+r} = W_t \quad (1)$$

i.e., the present value of lifetime consumption is the value of wage earnings when young.

17. Now suppose that a PAYG public pension is introduced, with contribution rate Θ and benefits B . The old now consume $A(1+r) + B$, while the young have after-tax earnings of $W(1-\Theta)$. The present value of lifetime resources is thus $W(1-\Theta) + B/(1+r)$, so that the lifetime present-value budget constraint for a young household in period t is

¹⁶ Wages, interest rates, and labor supply are all endogenous in the simulations presented in the next section.

$$C_{y,t} + \frac{C_{o,t+1}}{1+r} = W_t (1-\theta) + \frac{B_{t+1}}{1+r} \quad (2)$$

The PAYG structure of the public pension scheme means that benefits equal contributions in each period, or

$$B_t = \theta W_t (1+n) \quad (3)$$

where the $(1+n)$ term accounts for the fact that with a growing population, there are $(1+n)$ times as many young people this period than there were last period, and hence $(1+n)$ times as many young people as there are old ones this period. Combining (2) and (3) and considering steady-state values for all variables (dropping the time subscripts) yields

$$C_y + \frac{C_o}{1+r} = W \left[1 + \frac{(n-r)\theta}{1+r} \right] \quad (4)$$

18. Comparing (1) and (4), it is clear that the steady-state effects of PAYG public pensions on lifetime resources depend critically on whether the interest rate is smaller or larger than the growth rate of the population. The population growth rate is important because it is the source of growth in aggregate wages, the base for pension contributions.¹⁷ If the interest rate is the same as the population growth rate, then lifetime resources are unchanged (the term in brackets in (4) is equal to unity) by the introduction of a PAYG pension scheme.¹⁸ This makes sense, as the public pension scheme merely substitutes forced public saving at an "interest rate" equivalent to n (the population growth rate) for voluntary saving at rate r ; if r and n are equal, young workers pay in θW and receive $\theta W(1+r)$ when old, so that the yield on public pension saving is the same as the yield on private saving. If, on the other hand, the interest rate r is lower than the population growth rate n , the term in brackets is greater than unity, and hence the introduction of a PAYG public pension increases lifetime resources in the

¹⁷ In an economy where the wage per worker grows, the relevant comparison would be between the interest rate and the rate of growth of the wage base, e.g., (approximately) population growth plus the growth in the wage per worker (James and others (1995)). In the case of Canada, then, the simplified comparison presented above is somewhat biased against PAYG schemes.

¹⁸ This is true (absent imperfections in financial markets) even if the amount of forced saving is greater than what agents would save voluntarily, as they can offset such forced saving by borrowing at the same interest rate.

steady state. Finally, if the interest rate r is higher than the rate of population growth n , the scheme lowers lifetime resources; while benefits are greater than contributions, they are lower in present value, and hence lifetime resources are smaller than they would be in the absence of a public pension plan (that is, if Θ were 0).

19. Another way to view this issue is by comparison to the return on a fully-funded plan. A fully funded plan has a rate of return equal to r , whereas the PAYG scheme has a rate of return equal to n . Clearly, households are better off with whichever scheme has the higher rate of return.¹⁹ In the stylized example above, the public pension scheme can improve households' circumstances by creating a "security" that could not exist in the private market, because no private contract could enforce it. In a broader context, efficiency is the relevant consideration. In a more general setting, the introduction of a PAYG pension scheme can be Pareto-improving if the economy is dynamically inefficient (e.g., is saving too much).²⁰

20. This simple model can also yield some insights into population dynamics and the evolution of public pension plans. In the steady state, a higher population growth rate means a more favorable stance of a PAYG system compared to a fully funded one. Holding W constant in equation (3), for example, it is clear that when n increases, B must increase or Θ fall to maintain PAYG balance. This corresponds to the situation of the 1960s, when the CPP was introduced. The reverse holds as well, of course; during a "baby bust," when n falls, B must fall, Θ increase, or both. The latter situation corresponds to the problems the CPP faces in the years to come as the baby boomers retire.

21. Further insight into the effects of the introduction of a PAYG pension scheme can be gained by considering redistributive effects that take place outside the steady state. For example, when a PAYG scheme is introduced, the initial generation of retirees receives benefits without having paid contributions. These benefits are in effect paid for by a transfer of resources from the current young and future generations. Since young households have a lower marginal propensity to consume than old ones (in this simple model, the older generation consumes all its wealth, and so has a marginal propensity to consume of unity), the transfer of one dollar from a young to an old household increases aggregate consumption, and hence decreases aggregate saving.²¹ In general equilibrium, the resulting lower capital stock means a higher interest rate and a lower wage, further making the elderly better off and the young worse off.

¹⁹ Indeed, one proposal for CPP reform suggests that the plan vary its degree of funding depending on the prevailing interest rate—so-called "smart funding" (Canadian Institute of Actuaries (1996)).

²⁰ Blanchard and Fischer (1994). Also, in settings with uncertainty, public pension schemes can improve welfare by remedying failures in the private insurance market (James (1996)).

²¹ Also, there is more crowding out in the short run than in the long run, since future generations will reduce their consumption in response to their transfer to the initial old household.

22. Another way to view these crowding-out effects is by analogy to deficit finance. Auerbach and Kotlikoff (1987) show how relabeling contributions as “borrowing” and benefits as “principal plus interest payments” and augmenting the pension “deficit policy” with a set of transfers produces an economy with a deficit policy. Auerbach and Kotlikoff note that this implicit deficit policy crowds out private investment just as the traditionally-defined deficit can. In this relabeled economy, the amount of pension debt outstanding each period is equal to the amount of contributions collected each period. In an actual economy, of course, the amount of public pension “debt” can be much higher than annual contributions, since it would include the present value of the difference between past contributions and past benefits.

23. A final important issue is the linkage between contributions and benefits. One reason that public pension schemes may distort labor supply decisions is that marginal contributions may not yield any direct marginal benefit.²² Auerbach and Kotlikoff (1987) show that linkage of contributions to benefits can reduce the distortionary effects of the wage tax that funds contributions, by in effect eliminating the marginal distortion associated with that tax. In practice, of course, it is not clear that such a linkage exists for most public pension schemes; indeed, it seems that their salient characteristic is that in the past contributions per worker have risen more slowly than benefits per retiree, while in the future, the opposite is expected. Also, even with a dollar-for-dollar linkage of contributions and benefits at the margin, contributions and benefits may not be the same in present value for every household. For example, those who are elderly when the scheme is introduced receive benefits without making contributions. Hence, there is an implicit lump-sum tax or transfer, which may distort the decision whether to work. These considerations are illustrated in the simulations that follow.

E. The Simulation Model

24. This section describes the model used to illustrate the economic effects discussed above.²³ The model employed is the same as in Auerbach and Kotlikoff, though with tax parameters that match those in the Canadian economy.²⁴ The economy consists of three sectors: households, firms, and government. For the purpose of simplicity, there is no uncertainty (all agents have perfect foresight), the economy is closed, and there is no money (the numeraire is the single consumption good).

25. The household sector consists of 55 generations (a household of age 1 can be thought of as an adult of age 21, who lives to age 75). Each period, each household makes decisions

²² Marchildon, Sargent, and Ruggeri (1996) discuss the distortionary effects of payroll taxes.

²³ The Appendix contains details of the model, including parameter choices.

²⁴ Laurence Kotlikoff generously provided a copy of his simulation software. Jan Walliser also provided helpful advice on the simulations.

about how much to consume and how much labor to supply, based on a lifetime budget constraint and preferences for consumption and leisure.²⁵ Households that choose not to supply labor are “retired” (there is no involuntary unemployment in the model). As in the simple model described above, in each year, the number of age-1 households increases by n percent. Relative prices (current and future interest rates and wages), taxes, transfers, and household preferences determine how much each household saves, how much each consumes, and how much each works, and hence, aggregate saving, consumption, and labor supply.

26. A competitive production sector is represented by a Cobb-Douglas production function that converts capital and labor into the consumption good. Technology is assumed to be fixed over time, and firms can costlessly adjust capital and labor inputs. The labor of older workers is more productive than the labor of young ones. Technological parameters, interest rates and wages determine total demands for labor and capital.

27. The government can levy taxes on consumption, labor income, capital income, and total income. Taxes can be set exogenously (in which case the deficit is endogenous), or one tax can be determined endogenously in order to meet an exogenous deficit target. Government expenditures per capita, other than for pension benefits, are assumed constant over time, and are assumed to have no direct effects on household or firm behavior. A public pension system is funded on a PAYG basis by a separate wage tax from the one used for general revenues. On retirement at age 46 (age 66 in real-world years) the pension replaces a fraction of average lifetime wages. Contribution rates are determined endogenously in accordance with the plan's PAYG structure. The government, like households, faces an intertemporal budget constraint. In the steady state, the budget is in balance, but the government may issue one-year debt when the budget is not in balance during transition years. The government may also have an outstanding stock of debt in the initial steady state.

28. In equilibrium, the following conditions hold. Households demand the consumption good and supply labor and savings according to preferences and relative prices. Firms demand labor and capital according to technology and relative prices. Government finance and household and factor demands obey intertemporal budget constraints. The goods and factor markets clear (labor supply equals labor demand and investment equals savings). The solution algorithm follows the same structure. Test values for capital and labor are posited; wages and interest rates are derived from these test values and factor demand functions; and consistency with household factor supply functions is checked, which leads to new test values for capital

²⁵ In this model, households are self-contained units, in that they do not make bequests to future generations. The effect that bequests have depends on upon their form. For example, “joy of giving” bequests that do not link utility across generations will have only small economic consequences, while Barro-style bequests can mean that public pension schemes (and other fiscal policies) have no economic effects (Blanchard and Fischer (1994)).

and labor.²⁶ The model starts with an initial steady-state equilibrium, then determines the transition to another steady state over 150 years (in practice, it may take much less than 150 years for the model to settle down to a new steady state after a policy change). In steady states, the government budget is balanced and economic aggregates are constant on a per-capita basis, though this need not hold true during transitions, of course.

F. Policy Experiments

29. In order to illustrate the economic effects that changes in the provisions of public pensions have, six experiments were performed with the stylized model described above.²⁷ They shed some light on the economic effects that changes in provisions such as the CPP has experienced over the last 30 years and on possible effects of the changes that might occur with reform. For example, the introduction of the CPP itself has likely had some macroeconomic impact. Hence, the first experiment simulates the introduction of a public pension scheme. Also, the generosity of the CPP has increased over time, and there is a question as to whether reforms will reverse that increase. Hence, the second and third experiments simulate increases in the replacement rate; one permanent, one temporary. A third important issue is the linkage of contributions and benefits. Hence, the last three experiments repeat the first three, but with a marginal linkage of contributions and benefits, so as to illustrate the effects of the marginal distortion from the payroll tax. Table 1 summarizes the policies underlying each simulation experiment, and Tables 2–7 summarize the results of each experiment, while Charts 4 and 5 show the effects of various policies on key variables over time.

30. The first experiment is the *introduction of a public pension plan*. As mentioned above, the introduction of a PAYG public pension plan is equivalent to an explicit deficit policy, or a transfer from current and future (unborn) generations to the current elderly generation. In this regard, saving, capital formation, and output should fall. Table 2 shows that just such effects occur. In this experiment, the replacement rate rises linearly from 0 percent in year 0 (the initial steady state) to 25 percent in year 10, and stays at 25 percent thereafter, mimicking the gradual introduction of the CPP. The effects of the introduction of a PAYG pension scheme are to decrease income and consumption relative to the baseline; note that consumption falls by proportionally less than income, implying a decrease in saving. The decrease in saving is reflected in a drop in the capital stock of about 20 percent in the long run. Labor supply also contracts due to the higher tax on wages (it contracts by more in the short run than in the long

²⁶ Auerbach and Kotlikoff (1987) provide further details on the method of simulation.

²⁷ Experiments using the model were carried out by manipulating the replacement rate. This allows much more general types of experiments than it might seem at first. In all experiments, the public pension scheme remains a strict PAYG system. In such a system, only one parameter (either the replacement rate or the contribution rate) can be determined endogenously. Indeed, the design of the CPP recognizes this fact by periodically adjusting the schedule of contribution rates so as to target the level of assets.

run, as in the long run, income effects tend to dominate).²⁸ The average wage falls, since labor demand contracts with the fall in the capital stock, while interest rates rise. Finally, the tax rate on income rises to make up for the fall in the tax bases (consumption, income, and wages).

31. In Canada, there has been a trend increase in the generosity of benefits since the introduction of the CPP. Table 3 presents the results of a simulation of an *expansion of the public pension scheme*. In this simulation, the replacement rate rises from 0 to 25 percent over 10 years (as in the previous simulation), then rises an additional 5 percentage points over the subsequent 30 years (similar to the expansion of the CPP since its introduction). The relatively small increase in the replacement rate has concomitantly minor macroeconomic consequences; in the long run, income is about 1½ percent lower, the capital stock is about 3½ percent lower, and interest rates are 30 basis points higher than under the baseline.

32. Some of the proposed reforms to the CPP are equivalent to a *reduction in benefits back to historical levels* (for example, a decrease in the replacement rate to offset increased life expectancy). Hence it is useful to see the effects of a temporary increase in benefits, as opposed to the permanent increase in the previous simulation. Table 4 presents the results of a simulation in which the replacement rate is reduced to 25 percent in the long run after its increase to 30 percent as in the previous simulation. While the short-run effects of the increase in benefits are clearly present, the temporary increase has no long-run effects—the long-run steady state effect is about the same as in the case where replacement rates rise to 25 percent over ten years and stay there.

33. One important aspect of the public pension plans is the effect that the linkage of contributions and benefits has on labor supply. If an additional dollar of contributions does not result in an additional dollar of benefits in present value, the contribution that funds the pension scheme has the same distortionary effect on labor supply as an ordinary tax. Some proposals for the reform of public pension schemes have suggested that such a linkage be built into them, thereby removing at least part of the distortion. The last three experiments replicate the results above, but with a dollar-for-dollar marginal linkage of contributions and benefits in present value.²⁹

34. Table 5 presents the results of a simulation of the introduction of a *pension scheme with linkage of contributions and benefits*. The long-run reduction in income and consumption is about half that under the introduction of the pension scheme without the linkage. Labor supply actually expands slightly in the long run, which as noted above is due to income effects. Indeed, it makes sense that such effects prevail when the marginal distortion is removed. The contraction in the capital stock and increase in interest rates, while smaller than

²⁸ Auerbach and Kotlikoff (1987). In fact, in their experiments, labor supply sometimes expands slightly in the long run in response to the introduction of a public pension scheme.

²⁹ Of course, distortions from other sources, such as the transfer of resources from young and future generations to the initial generation of old households, will still have an effect in this experiment.

under the unlinked scheme, are still substantial. Finally, the required increase in the income tax is actually smaller than under the unlinked plan. This makes sense, as more of the fiscal gap can be closed with revenues from consumption and wage taxes than under the plan without linkages. Similar conclusions are implied by a simulation of an increase in the generosity of the plan with linkage of contributions and benefits (Table 6) and by a temporary increase in benefits (Table 7).

G. Conclusions

35. The CPP, like the public pension schemes in a number of other countries, faces significant challenges in the years ahead. These challenges mean that reform measures must be taken soon. The Canadian authorities recognize this urgency, and also recognize that in choosing among reform options, it is important to bear in mind the economic costs of each proposed change.³⁰ This paper has discussed some of the reform options and sketched some of the economic implications of changes in the provisions of a public pension plan in the context of a stylized dynamic general-equilibrium model.

36. The model implies that PAYG public pension schemes can have significant adverse effects on output and capital formation. Specifically, the intergenerational redistribution and distortionary taxes that fund such schemes can reduce aggregate savings and labor supply, which work to reduce the capital stock and output. Also, simple reforms, such as reversing an increase in generosity or linking benefits and contributions, can alleviate the impact that these schemes have on the economy.

³⁰ For example, in the statement released after the October 4 meeting of Ministers ("Principles to Guide Federal-Provincial Decisions on the Canada Pension Plan"), it is recognized that decisions about increases in contribution rates must be guided by consideration of their fiscal and economic impact.

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Table 1. Canada: Details of Policy Experiments

Case A	Introduction of a public pension plan	Increase replacement rate from 0 to 25 percent over 10 years (constant thereafter)
Case B	Permanent increase in benefits	Increase replacement rate from 0 to 25 percent over 10 years, then increase to 30 percent over 30 years (constant thereafter)
Case C	Temporary increase in benefits	Increase replacement rate from 0 to 25 percent over 10 years; increase to 30 percent over 30 years; then gradually return to 25 percent in the long run.
Case D	Introduction of a public pension plan with contribution-benefit linkage	Increase replacement rate from 0 to 25 percent over 10 years (constant thereafter), with 1-1 linkage of contributions and benefits in present value
Case E	Permanent increase in benefits with contribution-benefit linkage	Increase replacement rate from 0 to 25 percent over 10 years, then increase to 30 percent over 30 years (constant thereafter), with 1-1 linkage of contributions and benefits in present value
Case F	Temporary increase in benefits with contribution-benefit linkage	Increase replacement rate from 0 to 25 percent over 10 years; increase to 30 percent over 30 years; then gradually return to 25 percent in the long run, with 1-1 linkage of contributions and benefits in present value

Table 2. Canada: Effects of the Introduction of a PAYG Public Pension System 1/

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-4.17	-3.23	-3.93	-4.87	-0.25	0.06	1.80
20	-4.99	-6.35	-3.00	-10.71	-2.05	0.53	2.48
30	-5.52	-8.11	-2.50	-14.02	-3.09	0.82	2.90
50	-6.04	-9.76	-1.90	-17.44	-4.22	1.14	3.31
Long run steady state	-6.39	-10.87	-1.64	-19.33	-4.84	1.32	3.58

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

Table 3. Canada: Effects of a Permanent Increase in Benefits 1/

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-4.23	-3.27	-3.96	-5.05	-0.28	0.07	1.83
20	-5.31	-6.68	-3.27	-11.17	-2.11	0.54	2.64
30	-6.12	-8.85	-2.97	-14.98	-3.25	0.86	3.22
50	-7.12	-11.31	-2.47	-19.80	-4.77	1.30	3.92
Long run steady state	-7.72	-13.15	-1.98	-23.00	-5.85	1.64	4.39

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

Table 4. Canada: Effects of a Temporary Increase in Benefits 1/

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-4.23	-3.27	-3.96	-5.05	-0.28	0.07	1.83
20	-5.30	-6.68	-3.27	-11.15	-2.10	0.54	2.64
30	-6.11	-8.84	-2.96	-14.94	-3.24	0.86	3.21
50	-7.03	-11.21	-2.39	-19.66	-4.75	1.30	3.87
Long run steady state	-6.38	-10.86	-1.64	-19.29	-4.82	1.32	3.58

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

Table 5. Canada: Effects of Introduction of PAYG Pension Scheme with Linkage of Contributions and Benefits

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-1.90	-0.32	-0.66	-5.54	-1.25	0.32	0.66
20	-2.49	-2.51	-0.07	-9.40	-2.42	0.63	1.13
30	-2.86	-3.70	0.23	-11.55	-3.08	0.81	1.40
50	-3.24	-4.80	0.59	-13.87	-3.81	1.02	1.67
Long run steady state	-3.45	-5.54	0.80	-15.17	-4.22	1.14	1.83

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

**Table 6. Canada: Effects of a Permanent Increase in Benefits
with Linkage of Contributions and Benefits**

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-2.05	-0.36	-0.75	-5.83	-1.30	0.33	0.71
20	-2.73	-2.67	-0.15	-10.10	-2.59	0.68	1.23
30	-3.22	-4.04	0.17	-12.72	-3.39	0.90	1.57
50	-3.77	-5.48	0.65	-15.88	-4.39	1.19	1.94
Long run steady state	-4.13	-6.64	0.98	-17.96	-5.06	1.39	2.21

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

**Table 7. Canada: Effects of a Temporary Increase in Benefits
with Linkage of Contributions and Benefits**

(In percent)

Year	Income	Consumption	Labor Supply	Capital Stock	Average Wage	Interest Rate 2/	Tax Rate 3/
10	-2.05	-0.36	-0.75	-5.83	-1.30	0.33	0.71
20	-2.73	-2.67	-0.14	-10.09	-2.59	0.68	1.23
30	-3.20	-4.03	0.18	-12.68	-3.38	0.89	1.56
50	-3.69	-5.42	0.67	-15.67	-4.33	1.17	1.90
Long run steady state	-3.45	-5.55	0.80	-15.17	-4.22	1.14	1.84

1/ Change relative to baseline simulation.

2/ Arithmetic difference in rate from baseline.

3/ Change in the tax rate on income required to maintain budget balance.

CHART 1
CANADA
HISTORICAL AND PROJECTED ELDERLY DEPENDENCY RATIO (EXCLUDING QUEBEC) 1/
(In percent)

Source: The Canada Pension Plan Fifteenth Actuarial Report.

1/ Elderly dependency ratio: population aged 65 and over as a percentage of population 20-64.

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CHART 2
CANADA
REAL WAGE RATE AND INTEREST RATE 1/
(In percent)

Source: Statistics Canada.

1/ Deflated by CPI.

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CHART 3
CANADA
CURRENTLY LEGISLATED AND BENCHMARK SCHEDULE OF CONTRIBUTION RATES
(In percent)

Source: The Canada Pension Plan Fifteenth Actuarial Report.

EFFECTS OF DIFFERENT CPP POLICIES (Deviation from baseline in percent)

Source: Staff estimates.

EFFECTS OF DIFFERENT CPP POLICIES

(Deviation from baseline in percent)

Source: Staff estimates.

Description of the Model

37. The functional forms and parameter choices employed in the model are sketched here. To keep the notation simple, taxes are ignored in the descriptions (all calculations use the full set of taxes described in the main text). More details are available in Auerbach and Kotlikoff (1987).

38. In the Auerbach and Kotlikoff model, households choose paths for consumption (c) and leisure (l) over a 55-year lifetime, according to constant-elasticity-of-substitution (CES) preferences:

$$U(c,l) = \left[\frac{1}{1-1/\gamma} \sum_{t=1}^{55} (1+\delta)^{-(t-1)} u(c_t, l_t)^{(1-1/\gamma)} \right] \quad (5)$$

where preferences for year- t choices are given by

$$u(c_t, l_t) = \left[c_t^{1-1/\rho} + \alpha l_t^{1-1/\rho} \right] \quad (6)$$

Workers have an ability profile $\{e_t\}$ that represents increases in wages relative to the wage of a new adult (w_t) along with increases in ability over time. This profile reflects the accumulation of human capital with experience. The profile is assumed to reflect one obtained from cross-sectional data on earnings.³¹ Agents choose the sequence $\{c_t, l_t\}$ so as to maximize U subject to the constraint that the present value of lifetime consumption is no larger than the present value of lifetime earnings;

$$\begin{aligned} & \text{Max } U(c,l) \text{ subject to} \\ & \sum_{t=1}^{55} D_t w_t e_t (1-l_t) \geq \sum_{t=1}^{55} D_t c_t \\ & \text{where} \\ & D_t \equiv \prod_{s=1}^t [1+r_s]^{-1}. \end{aligned} \quad (7)$$

D_t is a discount factor, and r_s is the one-year interest rate prevailing in year s .

39. The parameter values used were the same as those employed by Auerbach and Kotlikoff (1990), for a study of Canada. The elasticity of substitution between consumption and leisure (the percentage change in the ratio of leisure to consumption in response to a

³¹ See Auerbach and Kotlikoff (1987).

1 percent change in the wage) is given by the parameter ρ ; it was set to 0.8. This value is high, relative to estimates from panel studies, though it is lower than the value (unity) used in James and others (1995), in a study of the CPP. Also, as Auerbach, Kotlikoff and Skinner, 1983, point out, the empirical evidence is consistent with a wide range of estimates of ρ ; 0.8 is at the midpoint of this range.³² The rate of discounting on future preferences is described by the parameter δ ; it was set to 0.015. Household preferences for leisure versus consumption are described by α , which was set to 1.5. The remaining parameter is γ , which describes the intertemporal elasticity of substitution; this parameter was set equal to 0.25.

40. The behavior of firms is governed by a production function that exhibits constant elasticity of substitution between capital K_t and labor L_t . It is assumed that the production sector is competitive with representative production function

$$Y_t = A \left[\epsilon K_t^{(1-1/\sigma)} + (1-\epsilon) L_t^{(1-1/\sigma)} \right]^{1/(1-1/\sigma)} \quad (8)$$

The parameter σ governs the substitutability of labor and capital (the percentage change in the capital/labor ratio in response to a one percent change in the ratio of the wage to the interest rate). This was set to unity, yielding a Cobb-Douglas production function. The parameter ϵ determines the intensity of capital relative to labor in the production function. This was set equal to 0.25. Total factor productivity A is held constant, and is calibrated so that the wage in the initial steady state (W_0) is scaled to unity.³³

41. The remaining parameters are tax rates. All the taxes employed in the Auerbach and Kotlikoff model, except for the tax on capital income, were employed in the simulations. The tax rates (assumed to be proportional) were estimated by dividing tax revenues by the tax base for a recent year (either 1995 or 1994, the latest year for which full data were available). The tax rates were estimated as follows. To estimate the income tax rate, general government personal tax revenues for 1994 as a percent of GDP were divided by personal income as a percent of GDP. To estimate the tax on consumption, general government indirect taxes as a percent of GDP were divided by consumption as a percentage of GDP. Finally, to estimate the payroll tax rate, total payroll tax revenues as a percentage of GDP (excluding pension contributions) were divided by wages as a percentage of GDP. This yielded tax rates (combined federal and provincial) of 23 percent for the consumption tax, 12 percent for the payroll tax (not including CPP contributions), and 23 percent for the income tax.

³² Also, the simple model presented in section 4 makes it clear that public pensions can have macroeconomic effects even when labor supply is inelastic.

³³ This corresponds to $A = 0.94$.

IV. DEVELOPMENTS IN PRODUCTIVITY ACROSS INDUSTRIES IN CANADA¹

A. Introduction

1. Since the mid-1970s, real output and productivity growth in Canada have slowed (Chart 1). From 1962 to 1973, real GDP grew at an average annual rate of 5.4 percent, and labor productivity grew by 3.3 percent. However, from 1973 through 1995, average annual real GDP and labor productivity growth have decreased to 2.6 percent and 1.1 percent, respectively. Previous studies on Canadian growth have inconclusively identified some causes for the slowdown, including intersectoral shifts of output and labor toward services and other industries with lower productivity growth, a lack of technological progress in several mature industries, an increase in the obsolescence of capital due to the regulatory environment and structural changes in the economy, and a reduction in the benefits from increasing scale.² Also, the rate of growth of the capital-labor ratio has decreased in Canada.

2. Slower growth has not been limited to Canada. Most OECD countries have experienced similar phenomena. In the United States, for example, average annual real GDP and labor productivity growth have declined, respectively, from 4.2 percent and 3.1 percent in 1962–1973 to 2.5 percent and 1.2 percent in 1973–1995 (see Chart 1). Studies of the U.S. economy have attributed the slowdown to similar causes as in Canada. An over hiring of labor (relative to other industrial countries) due to a falling real minimum wage has also been cited as a factor in the United States.³ In addition, Griliches (1994), Gordon (1996), and Slifman and Corrado (1996) emphasize that measured output and productivity growth may be

¹ Prepared by Ranil Salgado.

² For example, see Daly and Rao (1985), Denny et. al. (1992), Morrison (1992), Mullen and Williams (1994), and Fuess and Van den Berg (1995). Note that these papers generally focus on aggregate growth or growth at the major (one-digit) industrial level. Denny et. al. (1992) study manufacturing industries at the two-digit level.

³ For example, see Baily (1982), Morrison (1992), Griliches (1994), and Gordon (1996).

biased downward, and therefore, the slowdown may not be as large as suggested by the data.⁴ This may be the case in Canada as well.

3. One significant difference between the two countries has been productivity in the manufacturing sector. In the United States, manufacturing labor productivity growth decreased in the 1970s but has increased subsequently and returned to levels close to those observed in the 1960s. In Canada, however, the slowdown in the manufacturing sector has not been reversed.

4. This paper examines the recent growth performance of the Canadian economy at various levels of aggregation. In particular, it focuses on the slowdown in aggregate productivity growth that began in the mid-1970s and examines whether this slowdown has continued in recent years and is common across industries. The paper also assesses the extent to which the rapid increase in the share of services in the economy has contributed to reduced aggregate productivity growth and discusses whether the measured slowdown in services indicates an actual slowdown or problems in accurately measuring real output in that sector.

5. The rest of the paper is organized as follows. Section B discusses the issues and difficulties with measuring productivity and describes the methodology used in this paper to measure its growth. Section C presents the results for the aggregate economy and various levels of disaggregation. Section D offers some concluding remarks.

B. Measuring Productivity Growth

Measurement Issues

6. Productivity should reflect the efficiency of combining resources to produce output. It is usually measured by calculating the ratio of a weighted index of output to a weighted index of inputs. In a simple economy where there is one type of output and one type of input,

⁴ Griliches (1994) notes that the share of sectors in which output is easily measured (i.e., agriculture, mining, manufacturing, transportation, and utilities) has declined from 49 percent of U.S. GDP in 1947 to 31 percent of GDP in 1990. Gordon (1996) discusses the sources of bias in aggregate price indexes, as well as other measurement problems specific to industries, particular the service industries. Decomposing aggregate output by sector, Slifman and Corrado (1996) show that output and productivity growth have rebounded since the early 1980s to the level of the 1960s in all sectors other than nonfarm, noncorporate services. In fact for this sector, productivity growth has been negative while profitability has remained the same. They note that the kind of measured rapid relative price increases that reconcile these productivity and profitability trends appear unlikely and maybe due to difficulties in measuring prices in that service sector. All three papers conclude that real output growth is incorrectly measured and significantly underestimated.

productivity could be computed as the ratio of output to input. However, in an economy with heterogeneous output and inputs, there are several ways to compute productivity depending on the weights applied to each type of output and input.

7. The usual way to handle the heterogeneity of output is to construct an index of real output, where the physical units of output are weighted by their “real value,” computed by adjusting market values for inflation. One difficulty with this procedure arises in making the adjustment for inflation. In a modern, diverse economy, it becomes a difficult task to keep track of the prices of all products, especially given continuing quality improvements, product innovation, and outlet substitution. Therefore, various price indices are used to deflate nominal prices. For example, the consumer price index (CPI) and its components are used to deflate the final purchases of consumer goods and services (which are a large component of GDP). Gordon (1996) argues that the CPI is biased upwards, and, therefore, real output is improperly measured.⁵

8. A second difficulty arises when market prices for products do not exist. Examples of such products are output produced by the government and nonprofit institutions, services gained from owner-occupied dwellings, and goods produced for own consumption. In general, the prices for these products are computed based on the cost of their inputs or are imputed from prices of similar products.⁶ The use of the cost of inputs to measure real output (which is the method commonly used to measure government output) implies that productivity growth is zero.

9. There are several ways to handle the heterogeneity of inputs. For example, productivity can be measured as labor productivity, which is defined as output per employee or hours worked. In this case, labor (assumed to be homogenous) is the only input. Although this measure may be relatively easy to calculate and may be useful for studying real wage or per capita growth, it has a major limitation: namely, it measures output per unit of labor instead of output per unit of all inputs combined. As a consequence, growth in labor productivity includes growth in output due to the improved efficiency of all inputs (including labor) and the increased use of other productive inputs (including physical capital) relative to

⁵ The bias in the CPI stems from biases due to product quality changes, introduction of new products, outlet substitution, and product substitution. Although the upward bias in the CPI (using a fixed basket of products) need not be fully reflected in a downward bias in GDP (a variable basket of products), procedures for calculating real output ensure that part of the CPI bias gets transmitted to the measure of real output. For example, in Canada, real output in the banking sector is defined as the difference between the rate of return on assets and liabilities deflated by the CPI.

⁶ For example, services from owner-occupied dwellings are valued at the estimated rental prices of those dwellings.

that of labor. Furthermore, if labor is defined as total employment, growth in labor productivity would also include growth in average hours worked.

10. An alternative measure of productivity is total factor productivity (TFP), which, in principle, attempts to take into account contributions from all inputs. In practice, however, aggregate measures of TFP include only contributions from labor and physical capital (measures which generally exclude land, natural resources, and other inputs).

11. One problem in computing TFP comes from measuring inputs. Generally, labor is considered homogenous, while physical capital is valued at its deflated book or constant-dollar replacement value. When labor is not differentiated by skill level, TFP measurements implicitly include relative growth in human capital in the estimates of productivity growth. When physical capital is valued by deflating book or replacement values, biases from mis-measured price indices can alter the estimates of productivity. Furthermore, during a recession, if firms do not adjust factors immediately (because of the fixed nature of capital or labor hoarding), some of the change in productivity growth should be attributed to underemployed resources. Another problem in computing TFP comes from determining the appropriate weights for different inputs. If constant returns to scale and perfectly competitive markets are assumed, then the weights for these aggregate factors are their shares in total factor payments. Alternatively, the weights can be estimated as the input elasticities of the factors.

12. Sectoral productivity growth can be computed in several ways. Output can be measured as gross output, or it can be measured as value-added output (by industry, product, or a industry-product combination). Gross output is the market value of all output for an individual industry. Value-added output is gross output minus the purchases of goods and services used in production (also called intermediate consumption). Generally, sectoral labor productivity is computed using value-added output. For sectoral TFP, the set of inputs that are used depends on the measure of output. The appropriate group of inputs to employ when using gross output includes both primary factors and intermediate consumption, while the appropriate group when using value-added output is only the set of primary factors.

13. There are additional problems specific to measuring sectoral output and inputs. The first one arises because the output of some industries is the intermediate consumption of others. Therefore, for example, if real value-added output in one industry is underestimated, then real value-added output and productivity of other downstream industries will be overestimated.⁷ Griliches (1994), Gordon (1996), Maclean (1996), and others suggest that real service-sector output is underestimated relative to real goods-sector output because service output is often intangible and cannot easily be defined in terms of quantifiable units. Therefore, to the extent that services are the intermediate consumption of the goods sector, some of the productivity gains in the service sector may be incorrectly measured as

⁷ When the intention is to measure TFP, using gross output does not avoid this problem as the error in measurement will show up in inputs (intermediate consumption).

productivity gains for the goods sector.⁸ Furthermore, as goods-producing firms increase their demand for intermediate services due to outsourcing, this misallocation is exacerbated.

14. Assigning inputs to sectors presents another problem for sectoral productivity measurement. For example, in the finance, insurance, and real estate sector, capital owned is high, but much of this capital is leased out to other sectors. Because the capital stock is measured in terms of ownership, inputs into this sector tend to be overestimated, and as a consequence, TFP is underestimated.

Methodology

15. Labor productivity is calculated as the ratio of value-added GDP to homogenous labor hours, while TFP is calculated as the ratio of valued-added GDP to a weighted index of homogenous labor hours and physical capital. Therefore, the measure of labor productivity growth includes growth due to changes in inputs other than labor, while the measure of TFP growth includes changes in productivity due to changes in inputs (including human capital, land, and natural resources) other than labor and physical capital. Furthermore, the biases due to improper measurement of real output and/or real physical capital appear in labor productivity and TFP.

16. To calculate TFP, the method suggested and employed by Christensen, Jorgenson, and Lau (1973), Gollop and Jorgenson (1980), Young (1992), and Young (1994) is followed. As a second-order approximation for any given production function, the translog (or transcendental logarithmic) production function is used:

$$\ln Y = \alpha_0 + \alpha_K \ln K + \alpha_H \ln H + \alpha_t t + \frac{1}{2} B_{KK} (\ln K)^2 + B_{KH} (\ln K) (\ln H) + \frac{1}{2} B_{HH} (\ln H)^2 + B_{Kt} \ln K * t + B_{Ht} \ln H * t + \frac{1}{2} B_{tt} t^2 \quad (1)$$

where Y, K, H, and t are, respectively, output, capital, labor, and time. When there are constant returns to scale, the parameters satisfy the following conditions:

$$\alpha_K + \alpha_H = 1 \quad (2)$$

⁸ Note that to the degree that services are intermediate rather than final consumption, this misallocation will not change aggregate productivity.

$$B_{KK}+B_{KH}=B_{HH}+B_{KH}=B_{Kt}+B_{Ht}=0 \quad (3)$$

If equations (2) and (3) are satisfied, equation (1) can be simplified by differencing to provide a measure of the causes of growth across discrete time periods:

$$\Delta \ln Y = \alpha \Delta \ln K + \beta \Delta \ln H + \Delta TFP \quad (4)$$

where α is capital intensity, β is labor intensity, and ΔTFP provides a measure of the amount that the log of output would have increased had all inputs remained constant between the discrete time periods. With constant returns to scale,

$$\alpha + \beta = 1 \quad (5)$$

When there are perfectly competitive markets and firms maximize profits, β is also the labor share of total output and can be calculated by dividing labor compensation by output. In this case, α is the capital share of total output and can be calculated as $1-\beta$. This method for calculating TFP growth is usually called growth accounting because output growth can be allocated to growth in inputs and growth in productivity.

17. However, if the assumption of constant returns to scale is incorrect, then the calculated residual (i.e., TFP growth) will include changes due to changes in scale. Therefore, as an alternative to growth accounting, the coefficients for α and β in equation (4) can be estimated.

18. Initially, the productivity residual using growth accounting is estimated for each sector of the Canadian economy assuming constant returns to scale and profit maximization.⁹ Subsequently, these assumptions are tested by estimating equations (1) and (4) and testing the parameters from these estimates against the conditions in equation (2), (3), and (5).¹⁰ Labor productivity by sector is also estimated.

⁹ To be precise, profit maximization is assumed to hold only on average. Therefore, average labor share (rather than the actual labor share in each period) is used.

¹⁰ Estimating equation (1) in levels provides poor Durbin-Watson statistics. Therefore, the equation is estimated using first differences.

19. The data used to measure labor productivity and TFP growth were provided by Statistics Canada and include nominal and real value-added GDP, nominal labor compensation, hours of labor worked, and the real gross capital stock from 1961–1992 for the total economy, the business sector, the nonbusiness sector, goods-producing industries, service-producing industries and small (S) level industry aggregates. For many of the sectors, capacity utilization estimates for 1962–1992 were available, and the capital stock estimates were adjusted accordingly.¹¹

C. Productivity at the Aggregate and S Industry Level

20. Estimates of labor productivity growth for the S level industries and various aggregates are presented in Table 1. The first column of growth rates contains averages for the entire period (1962–1992), while the second, third and fourth columns provide average growth rates from 1962–73, 1973–81 and 1981–92, respectively.¹² Labor productivity growth slowed down in most of the sectors and the aggregate economy after 1973, and it has remained relatively low. In fact, only two sectors (fishing and trapping and construction) have growth rates during 1981–92 that are higher than during 1962–73. For three other sectors (mining, quarrying, and oil well; communication; and finance, insurance, and real estate), growth rates have decreased by less than one half percent. In contrast, for the other sectors and the five aggregates, the slowdown in labor productivity growth ranges from around 1 percent to more than 5 percent. For example, in manufacturing, the labor productivity growth rates are about the same in the 1970s and 1980s but more than 2 percent below the rates in the 1960s.

21. Table 2 provides the average annual TFP growth rates using the growth accounting methodology. In general, these results confirm that there has been little or no recovery from the slowdown of the 1970s. However, there are differences between using labor productivity and TFP to measure productivity growth. For the goods sectors (except construction), the TFP measures show less of a slowdown between 1962–73 and 1981–92, while for the service sectors (except transportation and storage and finance, insurance, and real estate), using TFP magnifies the slowdown. This discrepancy is reconciled by noting that growth in the capital services to labor ratio slowed in the goods sectors (except for construction), but it increased in the service sectors (except for transportation and storage and finance, insurance, and real

¹¹ See appendix for more details. The rationale for adjusting the data for capacity utilization is to attempt to remove demand conditions as a contributing factor for changes in productivity. However, this adjustment may not completely purge the data of cyclical effects. In particular, labor hoarding and work effort effects remain.

¹² The rationale for dividing the post-1973 period into two periods is to abstract from the demand-induced slowdown due to the energy-price shocks of the 1970s.

estate) between the two periods.¹³ Controlling for the change in the capital services to labor ratio by sector, the slowdown in productivity growth in the service-producing industries is larger than in the goods-producing ones. Therefore, it is possible that the sectoral shift in the economy towards services explains part of the aggregate slowdown in productivity growth.

22. Several of the sectors have negative TFP growth for significant periods of time. For example, finance, insurance, and real estate has negative TFP growth in every period. As this seems unlikely, the negative growth may be the result of mis-measuring real output and inputs or the result of assuming constant returns to scale and profit maximization. Because labor productivity is positive for finance, insurance, and real estate in all three time periods, it appears possible that the real capital stock in that sector is overestimated.

23. Table 3 displays the results of testing the hypothesis of constant returns to scale using equations (2) and (3) on the OLS estimated parameters of equation (1). This hypothesis can be rejected at a 5 percent level of significance for four industries (fishing and trapping; construction; retail trade; and finance, insurance, and real estate) and at a 10 percent level for the nonbusiness sector. These results question the validity of using growth accounting for all the sectors.

24. Table 4 shows the results of OLS regressions of equation (4) for the S level industries and aggregates. The regressions for agriculture and fishing and trapping have extremely low R-squared, and therefore, the subsequent hypothesis tests are not very meaningful. The poor fit may be the result of excluding significant inputs in those sectors, namely, land and natural resources. Furthermore, the Durbin-Watson statistics for several of the regressions are quite poor. So the results must be viewed with some caution.

25. The last three columns of Table 4 report the results from tests of various hypotheses for these sectors. The column labeled "CRS" displays the results of the test for constant returns to scale, while the column labeled "Profit" shows the results of the test for profit maximization.¹⁴ The last column shows the results of Chow tests which compare the stability of parameters between 1962–73 and 1974–92.

26. For the 16 sectors and the aggregates (excluding the two sectors for which the regressions fit poorly), the estimates generally confirm the results of testing constant returns to scale for the translog production function. They also show mixed evidence for profit maximization and provide relatively strong evidence of a structural break around 1973. Constant returns to scale are rejected for four of the sectors at the 5 percent level of significance, and one other at the 10 percent level. The scale results match those of Table 1,

¹³ Capital services are calculated by multiplying the capital stock by capacity utilization.

¹⁴ In this model, given constant returns to scale, profit maximization implies that labor intensity equals the labor share of GDP.

except in two sectors: mining, quarrying, and oil well and manufacturing. For mining, quarrying, and oil well, Chow tests show parameter instability when estimating the translog production function, while for the manufacturing sector, the estimates of labor and capital intensity point to increasing returns to scale. For the other four sectors (mining, quarrying, and oil well; construction; retail trade; and finance, insurance, and real estate), the parameter estimates point to decreasing returns to scale.

27. Profit maximization is rejected for 3 of the 16 sectors at the 5 percent level of significance and for 3 others at the 10 percent level. It is interesting to note that for all five aggregate measures, both constant returns to scale and profit maximization are not rejected at the 5 percent or 10 percent levels. This result provides some evidence to support using growth accounting at least for the aggregates. For the 11 S level industries, profit maximization or constant returns to scale is rejected for 5 of the sectors (mining, quarrying, and oil well; construction; other utilities; retail trade; and finance, insurance and real estate) at the 5 percent level and for 3 others (logging and forestry; manufacturing; and communication) at the 10 percent level. Only for three industries (transportation and storage; wholesale trade; and community, business and personal services) can neither assumption be rejected at the 10 percent level of significance. These results suggest that the TFP estimates made using growth accounting for the S level industries should be viewed with caution.

28. For 8 of the 16 sectors, Chow tests reject stable parameters at the 5 percent level of significance and for 2 other sectors at the 10 percent level. These results confirm the notion that there was a structural change in the economy occurring around 1973. However, it is interesting to note that manufacturing is one of the sectors for which parameter stability is not rejected.

29. Table 5 shows the results of estimating equation (4) while allowing TFP growth (g) to vary or g , α , and β to vary between 1962–73 and 1974–92.¹⁵ These regressions make it possible to control for parameter instability and scale (while not assuming profit maximization). Once g is allowed to vary, Chow tests cannot reject α and β remaining the same between periods for all sectors but construction. Essentially, the change in measured output growth is explained by changes in TFP growth for these sectors.

30. The results are quite illuminating. For all five aggregate sectors, as well as five of the S level industries (mining, quarrying, and oil well; construction; transportation and storage; other utilities; and retail trade), the change in TFP growth between periods is significant at the

¹⁵ For the construction sector, the table shows the regression which allows all three parameters to change (since the Chow test fails for the regression allowing only g to vary). For the other sectors, the table shows the regression allowing only g to change. Chow tests on parameter estimates for equation (4) during the period 1974–92 confirm parameter stability in this period (results not shown). Therefore, it does not seem necessary to separate this period further.

5 percent level. For one other S level industry (community, business and personal services), the change is significant at the 10 percent level.

31. Three of the six S level sectors with a TFP growth slowdown are service industries. For these three sectors, this result agrees with the estimates of TFP growth calculated by growth accounting. However, the hypothesis that there has been no slowdown in TFP growth for the communication and wholesale trade sectors cannot be rejected, in contrast to estimates made using growth accounting. For finance, insurance, and real estate, both techniques show no change in TFP growth. Controlling for decreasing returns to scale, the TFP growth in that sector has been positive.

32. The slowdown for the goods-producing industries is driven by mining, quarrying, and oil well; construction; and other utilities. For the first of these sectors, the growth accounting result that TFP growth has rebounded is reversed after controlling for decreasing returns in that sector. For the other two sectors, the growth accounting estimation is confirmed. It is particularly interesting to note that for manufacturing, the hypothesis that TFP growth is unchanged cannot be rejected after controlling for increasing returns to scale. For the other three sectors (agriculture and related industries, fishing and trapping, and logging and forestry), there does not appear to be a slowdown of TFP growth.

D. Concluding Remarks

33. The results presented here confirm that there has been a slowdown in aggregate productivity growth and that this slowdown has occurred across several industries. This study also highlights the difficulty in defining an appropriate measure for productivity growth (whether it be labor productivity or total factor productivity) and determining the best procedure to calculate this measure. In particular, the assumption of constant returns to scale may not be valid for several industries, and therefore, the growth accounting methodology to calculate TFP may be inappropriate at the sectoral level. Furthermore, because some of the regressions have low R-squared and/or poor Durbin-Watson statistics, the results must be viewed with caution.

34. The study focuses on three potential explanations for the slowdown in aggregate productivity growth: the intersectoral shift of output and labor towards services, a reduction in the benefits from increasing scale in manufacturing, and a slowdown in capital accumulation (adjusted for capacity utilization) relative to labor force growth. The relative contribution of intersectoral shifts in the productivity slowdown can be measured by decomposing the estimated productivity growth into growth that would have taken place if the initial shares of the sectors had remained constant at their original levels and the rest, which basically reflects the effect of the changes in shares. The relative contribution of the reduced benefits from increasing scale in manufacturing can be calculated by comparing observed aggregate productivity growth to aggregate productivity growth if the manufacturing sector had continued to expand at its 1962–73 growth rates. The relative contribution of the slowdown

in the growth of the capital services to labor ratio can be measured by multiplying this slowdown by the capital intensity coefficient or equivalently, by calculating the difference between labor productivity and TFP growth.

35. The results from these calculations show that intersectoral shifts account for 0.05 percent of the 2.15 percent slowdown in aggregate labor productivity growth between 1962–73 and 1974–92. The reduction in the benefits from increasing returns to scale in manufacturing accounts for 0.52 percent, and the reduction in the growth of the capital services to labor ratio accounts for 0.34 percent. The residual is 1.24 percent which can be attributed to a slowdown in technical progress or a variety of other factors.¹⁶ The slowdown in TFP growth (measured using growth accounting) between 1962–73 and 1974–92 is equivalent to the slowdown in aggregate labor productivity growth less the slowdown in the capital services to labor ratio or equal to 1.81 percent. For TFP growth, intersectoral shifts account for 0.04 percent and the reduction in benefits from increasing returns to scale accounts for 0.62 percent of the slowdown, leaving a residual of 1.15 percent.

36. The somewhat surprising result is that intersectoral shifts account for a very minor part of the slowdown in aggregate productivity. This occurs because the slowdown in productivity growth has taken place across many industries in Canada. There has been almost as much of a slowdown in the goods-producing sectors as in the service-producing sectors. Given the downward bias in measuring real output in the service sector, the part of the slowdown due to intersectoral shifts may in fact be overstated.

¹⁶ As mentioned before, these factors include relative changes in the average level of labor skills (or human capital accumulation), in the quality and quantity of land and natural resources, in the underutilization of resources (for example, due to labor hoarding, work effort effects, or incorrectly measuring capacity utilization), and in the obsolescence of capital.

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Table 1. Canada: Growth in Labor Productivity for S Level Industries and Aggregates

(Annual averages, in percent)

Sectors	1962-92	1962-73	1973-81	1981-92
Agriculture and related industries	2.66	4.51	1.48	1.68
Fishing and trapping	-0.31	-2.24	-1.92	2.80
Logging and forestry	3.12	4.83	2.15	2.11
Mining, quarrying, and oil well	1.63	5.52	-8.45	5.07
Manufacturing	2.61	4.15	1.64	1.77
Construction	1.19	0.07	4.08	0.22
Transportation and storage	2.78	5.29	-0.10	2.37
Communication	5.74	5.60	6.84	5.09
Other utilities	2.48	5.65	0.69	0.60
Wholesale trade	2.00	2.55	1.56	1.78
Retail trade	1.35	2.72	-0.66	1.44
Finance, insurance, and real estate	0.74	0.76	1.16	0.41
Community, business, and personal services	0.72	1.78	0.89	-0.47
Nonbusiness sector	0.60	1.34	0.21	0.15
Business sector	2.26	3.76	1.40	1.38
Goods-producing industries	2.77	4.61	1.55	1.81
Service-producing industries	1.74	2.71	1.20	1.16
Total economy	1.95	3.31	1.20	1.13

Table 2. Growth in TFP for S Level Industries and Aggregates

(Annual averages, in percent)

Sectors	1962-92	1962-73	1973-81	1981-92
Agriculture and related industries	1.81	1.48	-0.94	4.13
Fishing and trapping	-0.07	-2.35	-1.80	3.47
Logging and forestry	3.26	3.87	2.57	3.17
Mining, quarrying, and oil well	-0.41	1.88	-9.94	4.22
Manufacturing	1.70	3.07	0.92	0.89
Construction	0.71	-0.16	3.02	-0.09
Transportation and storage	2.69	4.95	0.45	2.07
Communication	4.66	5.04	5.90	3.38
Other utilities	1.26	3.79	0.29	-0.57
Wholesale trade	2.06	3.11	1.81	1.19
Retail trade	1.28	2.92	-0.42	0.87
Finance, insurance, and real estate	-2.30	-2.54	-2.13	-2.18
Community, business, and personal services	0.63	1.79	1.09	-0.85
Nonbusiness sector	0.57	1.33	0.09	0.15
Business sector	1.44	2.67	0.66	0.79
Goods-producing industries	1.53	2.90	0.12	1.20
Service-producing industries	1.29	2.44	1.13	0.27
Total economy	1.35	2.50	0.63	0.72

Table 3. Canada: Testing for Constant Returns to Scale 1/

S Level Industries and Aggregates	F(4,D)Statistic 2/	P-value
Agriculture and related industries	2.030	0.125
Fishing and trapping	2.862	0.048
Logging and forestry	0.723	0.586
Mining, quarrying, and oil well	1.777*	0.171
Manufacturing	0.419	0.793
Construction	31.122	0.0
Transportation and storage	0.512	0.728
Communication	1.401	0.266
Other utilities	0.095	0.983
Wholesale trade	1.423	0.261
Retail trade	6.283	0.002
Finance, insurance, and real estate	6.940	0.001
Community, business, and personal services	0.782	0.549
Nonbusiness sector	2.681*	0.058
Business sector	1.580*	0.216
Goods-producing industries	0.074	0.989
Service-producing industries	0.936	0.462
Total economy	0.904	0.479

1/ Null hypothesis: Restrictions in equations (2) and (3) hold.

2/ D refers to degrees of freedom, which are 22 for agriculture and related industries; fishing and trapping; communication; and the nonbusiness sector and 21 for the other industries.

* Parameters are unstable at the 10 percent level of significance.

**Table 4: Testing for Constant Returns to Scale, Profit Maximization
and Parameter Stability 1/
S Level Industries and Aggregates**

Sectors	g	α	β	R-squared	DW	CRS	Profit	Chow
Agriculture and related industries	0.0146 (0.64)	0.101 (0.28)	-0.004 (0.01)	0.003	2.62	0.209	0.424	0.960
Fishing and trapping	0.0044 (0.24)	0.092 (0.50)	0.203 (1.15)	0.066	2.37	0.003	0.029	0.583
Logging and forestry	0.0321 (3.61)	0.387 (3.94)	0.495 (2.96)	0.775	1.22	0.314	0.067	0.051
Mining, quarrying, and oil well	0.0012 (0.09)	0.631 (3.82)	-0.354 (-1.32)	0.370	1.10	0.002	0.017	0.131
Manufacturing	0.0090 (1.27)	0.558 (2.93)	0.718 (3.21)	0.790	1.25	0.066	0.876	0.463
Construction	-0.0072 (-2.27)	0.670 (14.88)	-0.061 (-0.94)	0.922	1.84	0.000	0.000	0.001
Transportation and storage	0.0269 (3.33)	0.461 (2.36)	0.484 (2.09)	0.306	1.31	0.843	0.317	0.054
Communication	0.0504 (6.10)	0.436 (2.62)	0.306 (2.11)	0.330	1.36	0.207	0.059	0.425
Other utilities	0.0011 (0.12)	1.125 (7.10)	0.036 (0.44)	0.651	0.57	0.380	0.006	0.002
Wholesale trade	0.0230 (3.18)	0.177 (1.85)	0.733 (4.15)	0.519	1.45	0.601	0.907	0.181
Retail trade	0.0218 (3.28)	0.051 (0.53)	0.475 (2.30)	0.195	1.08	0.029	0.085	0.047
Finance, insurance, and real estate	0.0168 (2.87)	0.188 (2.24)	0.319 (3.71)	0.518	2.05	0.001	0.851	0.030
Community, business, and personal services	0.0124 (1.30)	0.159 (3.40)	0.704 (1.60)	0.469	2.17	0.465	0.582	0.304
Nonbusiness sector	0.0043 (0.97)	0.336 (2.46)	0.704 (5.72)	0.644	1.56	0.802	0.120	0.000
Business sector	0.0138 (3.97)	0.477 (5.32)	0.413 (2.77)	0.801	1.05	0.319	0.164	0.000
Goods-producing industries	0.0052 (1.02)	0.675 (6.01)	0.375 (2.36)	0.809	1.57	0.668	0.120	0.145
Service-producing industries	0.0206 (4.85)	0.176 (2.48)	0.634 (4.36)	0.679	1.12	0.123	0.933	0.000
Total economy	0.0144 (4.34)	0.388 (4.93)	0.492 (3.00)	0.770	1.59	0.353	0.274	0.000

1/ Regression (t statistics in parenthesis): $\Delta \ln y = g + \alpha \Delta \ln K + \beta \Delta \ln L$. Chow reports the p-values for the null hypothesis of parameter stability, CRS reports those for the null hypothesis of constant returns to scale, and Profit reports those for the null hypothesis of β is equal to labor share of output.

Table 5: Controlling for Scale and Parameter Instability 1/

S Level Industries and Aggregates	Allow g, α and/or β to vary		
	g	Δg	Chow
Agriculture and related industries	0.0301 (0.72)	-0.0214 (-0.44)	0.999
Fishing and trapping	-0.0165 (-0.53)	0.0340 (0.86)	0.881
Logging and forestry	0.0222 (1.36)	0.0157 (0.73)	0.147
Mining, quarrying, and oil well	0.0375 (1.77)	-0.0526 (-2.12)	0.804
Manufacturing	0.0192 (1.86)	-0.0148 (-1.34)	0.930
Construction	0.0029 (0.77)	-0.0164 (-3.32)	0.999
Transportation and storage	0.0509 (4.11)	-0.0354 (-2.42)	0.642
Communication	0.0584 (5.92)	-0.0128 (-1.43)	0.927
Other utilities	0.0325 (3.40)	-0.0368 (-4.63)	0.966
Wholesale trade	0.0355 (3.27)	-0.0175 (-1.51)	0.619
Retail trade	0.0431 (4.75)	-0.0313 (-3.05)	0.979
Finance, insurance, and real estate	0.0221 (2.78)	-0.0060 (-0.98)	0.109
Community, business, and personal services	0.0261 (2.24)	-0.0194 (-1.89)	0.978
Nonbusiness sector	0.0251 (5.23)	-0.0182 (-5.64)	0.941
Business sector	0.0280 (7.23)	-0.0195 (-4.88)	0.664
Goods-producing industries	0.0190 (2.64)	-0.0171 (-2.50)	0.998
Service-producing industries	0.0345 (7.67)	-0.0189 (-4.47)	0.110
Total economy	0.0285 (8.31)	-0.0192 (-5.53)	0.315

1/ Regression (t statistics in parenthesis): $\Delta \ln y = g + \alpha \Delta \ln K + \beta \Delta \ln L$, allowing g, α and/or β to vary between time periods 1962-73 and 1974-92). Chow reports the p-values for the null hypothesis of parameter stability. For sectors other than construction, only g varies. For construction, all three parameters vary.

CANADA AND UNITED STATES
GDP, LABOR PRODUCTIVITY, AND CAPITAL-LABOR RATIOS

Sources: Statistics Canada; Bureau of Economic Analysis, U.S. Department of Commerce; and Bureau of Labor Statistics, U.S. Department of Labor.

Data

37. The Canadian System of National Accounts divides the total economy into the business and nonbusiness sectors. Within the business sector, industries are further divided into seven small (S) level goods-producing industries and six S level service-producing industries. The goods-producing industries are agriculture and related industries; fishing and trapping; logging and forestry; mining, quarrying, and oil well; manufacturing; construction; and other utilities. The service-producing industries are transportation and storage; communication; wholesale trade; retail trade; finance, insurance and real estate; and community, business, and personal services.

38. The general method used to calculate real value-added output is by double deflation, that is, subtract the deflated value of intermediate consumption from the deflated value of gross outputs. The double deflation method is only accurate under some restrictive conditions. For example, the double deflation technique distributes total real value-added according to base-year relative prices. Therefore, if relative prices change, double deflation allocates too much value-added to the industry with a decrease in its relative price. This misallocation leads to problems. For example, it makes it possible to have negative value-added or a negative gross operating surplus.

39. Capacity utilization data are available for many of the S level industries. When the data are not available, the capital stock estimates are adjusted using data from similar industries as a proxy. However, for four of the sectors (agriculture and related industries, fishing and trapping, communication, and the nonbusiness sector), the capital stock is not adjusted.

V. MEASUREMENT BIAS IN THE CPI IN CANADA

1. The consumer price index (CPI) is commonly used as a measure of inflation and is often used to adjust tax rates, government spending, and private sector wage contracts for changes in the cost of living. Given the CPI's central importance in this regard, considerable attention recently has been directed at gauging its accuracy in measuring the cost of living. This paper presents an overview of research in this area and a comparison of the potential biases in the CPIs for Canada and the United States.

2. The CPI in Canada measures the cost to households of purchasing a representative basket of goods and services. The composition and the relative weights of the goods and services in this representative basket are revised every four years using information on consumer expenditures from the Family Expenditure Surveys. Prices for the goods and services in the representative basket are derived by pricing 600 items at various retail outlets across Canada.

3. By pricing a fixed-weighted basket of goods and services, the CPI is able to isolate the impact of price changes. However, the use of fixed weights in the index means that the CPI over time is likely to become less representative of the "true" cost of living as individuals respond to price changes and new choices. Differences between the CPI and the cost of living, typically referred to as measurement biases, arise from several sources. Major sources of bias include: (1) commodity substitution bias; (2) outlet substitution bias; (3) quality bias; and (4) new goods bias.

A. Commodity Substitution Bias

4. Commodity substitution bias arises because, as relative prices change, consumers substitute cheaper goods and services for more expensive ones in their purchases. Thus, the commodity composition of actual purchases of goods and services may differ significantly from their relative shares in the basket priced by the CPI.¹ For Canada, Gnreux (1983) estimates that the average annual commodity substitution bias between 1957 and 1978 was about 0.2 percent. Fortin (1990) and Crawford (1993) have argued that this bias has declined over time as a result of more frequent CPI basket revisions and less dramatic changes in

¹ The substitution bias often is separated into upper and lower level substitution bias, reflecting the way in which the CPI is derived in practice. Upper level bias refers to the bias arising from substitution by consumers between the major spending categories in the CPI. Lower level substitution bias arises from substitution among the goods and services that comprise spending categories at a more disaggregated level. In January 1995, Statistics Canada began calculating its lower level price indices using the geometric mean in order to minimize lower level substitution bias.

relative prices. For the United States, the Advisory Commission (1996) estimates that the substitution bias is about 0.4 percent annually, roughly comparable to Lebow et al.'s (1994) estimate in the range of 0.4 to 0.5 percent.

B. Outlet Substitution Bias

5. As prices change, consumers tend to shift their purchases from one type of retail outlet to another.² At the same time, innovations in retailing will lead to the creation of new types of retail outlets that will not be covered (at least initially) in the CPI's sample of retailers.³ Analysts have derived estimates for this bias by calculating the shift in the market share toward low-price outlets and the percentage price differential between high and low price outlets. Crawford (1993) estimates this bias in Canada at 0.1 percent annually, based on an annual shift of 2 percentage points in the market share of lower-priced retailers and assuming a price differential of 10 percent between higher- and lower-priced outlets. This estimate is comparable to that of Lebow et al. (1994) for the United States.

C. Quality Bias

6. The quality of the goods and services in the market basket may change over time. To the extent that the CPI fails to pick up these changes in quality, the index will not reflect the "true" change in prices. This source of bias may have the effect of either overstating or understating changes in the cost of living. Gordon (1990) estimates that the positive bias in the CPI for durable goods in the United States was 1 percentage point per year over the 1973–83 period.⁴ Crawford (1993) assumes that all of the quality bias for Canada occurs in consumer durables and estimates its average annual magnitude at about 0.2 percent. For the United States, Lebow et al. (1994) identify those categories where year-to-year quality adjustment difficulties appear to be most acute, and they attribute Gordon's estimate of the

² For example, in recent years, there has been a significant shift in retail purchases in Canada and the United States away from traditional higher-priced outlets (such as department stores) to lower-priced ones (such as discount stores and mail-order catalogues).

³ The creation in Canada and the United States of so called "warehouse" stores that sell items in bulk at low margins over wholesale prices and offer limited customer services is a good example.

⁴ For example, innovations in durable goods generally are assumed to have improved the quality of these commodities and is not adequately captured in the CPI, thus overstating the rate of price increase. In contrast, a service like rent may result in a bias that understates the cost of living, because the index is obtained by tracking a progressively older rental stock and may fail to correct for declining quality which comes with increasing age.

bias in consumer durables to these categories. These assumptions yield an upper bound for the bias at 0.3 percent per year.

D. New Goods Bias

7. Over time, items included in the market basket may cease to be produced and/or new products are introduced. Matching discontinued items in the market basket with new products replacing them can introduce a bias, since the two products are not likely to be identical. In addition, new products generally are brought into the CPI sample in a way that guarantees that their prices have no effect on the level of the index at the time they are introduced. Given that the prices of some types of new goods (especially large ticket items, such as consumer electronics) may fall shortly after their introduction to the market, the CPI could overstate changes in the cost of living, since the CPI market basket may not be updated to include these new products until after these price declines have taken place. In attempting to measure this bias, analysts have tended to take a fairly narrow view of the share of spending on new goods in total consumer expenditure. In particular, Crawford (1993) argues that new goods are limited to household appliances and electronic equipment and therefore his estimate of the new goods bias in Canada at 0.1 percent annually is at the low end of the range. For the United States, Lebow et al. (1994) find that the new goods bias has an upper limit of 0.5 percent.

E. Overall Bias

8. It is believed that the separate biases have a cumulative effect on the overall CPI. Thus, aggregating the estimates of the various types of biases yields a lower average range for the estimate of an overall bias in the CPI for Canada than for the United States. The average overall bias in Canada's CPI is estimated to be in the range of 0.5–1 percent per year, whereas the average range for the bias in the U.S. CPI is estimated to be 0.6–1.5 percent per year (tabulation below). A lower aggregate bias in the CPI would be expected in Canada than in the United States because the CPI basket of goods and services is revised more frequently in Canada and Statistics Canada has taken steps to reduce lower-level substitution bias.

Magnitude of Bias in the Change in the CPI

(Percent per year)

Type of Bias	Canada		United States	
	Crawford	Fortin	Advisory Commission	Lebow et al.
Commodity substitution bias	0.1-0.2	Less than 0.2	0.4	0.4-0.5
Outlet substitution bias	0.1	--	0.1	0.0-0.1
Quality bias	0.2	--	0.6	{0.0-0.3
New goods bias	Less than 0.1	0.3-0.8}		{0.0-0.5
Overall bias	0.5	0.5-1.0	0.8-1.6 1/	0.4-1.4

1/ Plausible range of estimates.

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VI. THE BANK OF CANADA'S MONETARY POLICY OPERATING FRAMEWORK¹

A. Introduction

1. In recent years there have been important changes in the way in which the Bank of Canada conducts monetary policy. In particular, the Bank adopted explicit inflation targets and introduced important changes to its operational framework. This paper reviews some of the key issues associated with the recent changes in the Bank of Canada's monetary policy framework and examines various indicators of central bank credibility.
2. The Government and the Bank of Canada in February 1991 announced targets for inflation, aiming at reducing CPI inflation to a range of 1 to 3 percent by the end of 1995, and since then the Bank has conducted monetary policy so as to achieve this target. Inflation was brought within the target range earlier than expected, and it was announced in December 1993 that the 1 to 3 percent target range would be extended through the end of 1998.
3. Recently, the Bank of Canada also has made some important changes to the way in which it implements monetary policy. Since June 1994, the operational objective of monetary policy is to keep the overnight interest rate within a 50-basis point range. This change shifted the focus away from the three-month treasury bill rate toward the overnight interest rate as the Bank's short-term operational objective. In February 1996, the Bank of Canada announced that the Bank Rate would be set at the upper limit of the operating band for the overnight rate.² Previously, the Bank Rate was set 25 basis points above the tender average for the three-month treasury bill rate. The main objective of these changes was to reduce the degree of uncertainty regarding policy objectives and to increase the transparency with which the Bank of Canada conducts monetary policy (see Noël (1995)).
4. The paper is organized as follows. Section B discusses the main issues associated with setting inflation targets. Particularly important in this regard is the monetary authorities' forecast of inflation and the policy reaction to inflationary "surprises" or shocks. Section C discusses the transmission mechanism of monetary policy and the role of the Monetary Conditions Index as an operational target. Section D discusses the Bank of Canada's day-to-day implementation of monetary policy and the operational changes that have been recently introduced. Section E examines several indicators of central bank credibility.

¹ Prepared by Brenda González-Hermosillo and Takatoshi Ito.

² The Bank Rate is the interest rate used by the Bank of Canada for advances to direct clearers (the major financial institutions that maintain accounts at the Bank for clearing and settlement purposes), and for purchase and resale transactions with a designated group of investment dealers and banks (known as "jobbers").

B. Inflation Targets

5. Similarly to other central banks that have announced explicit inflation targets, the Bank of Canada's decision-making process involves several basic steps: (1) a forecast of the rate of inflation one to two years into the future; (2) a view on the transmission mechanism between changes in policy instruments and the rate of inflation; and (3) an operational framework through which to implement monetary policy, and a mechanism to communicate the rationale for the policy actions.

6. The inflation forecast is the crucial starting point for the analysis of what is required to keep inflation within its target band over the policy horizon. Several models have been used at the Bank of Canada to forecast major macroeconomic variables (including inflation).³ The framework currently used in the preparation of the Bank staff's quarterly economic projection is the new Quarterly Projection Model (QPM).⁴ In contrast with most of the past models used at the Bank of Canada, QPM is *calibrated* to reflect the empirical evidence, rather than being directly estimated through econometric methods.⁵

³ The various alternative models used at the Bank of Canada are reviewed in Coletti, Hunt, Rose, and Tetlow (1996). Some of the published research at the Bank of Canada includes Duguay (1994) where a simple Phillips curve, based on the assumption that expectations are formed adaptively, is estimated for Canada for the period 1968Q4–1990Q4.

⁴ QPM can be viewed as a “system” formed by two formal models: one of the steady state or long-run equilibrium and a set of dynamic relationships that provide paths linking starting conditions to the solutions implied by the steady state. The steady state QPM model is reviewed in Black, Laxton, Rose, and Tetlow (1994), while the dynamic properties of QPM are discussed in Coletti, Hunt, Rose, and Tetlow (1996). Some of the structural relationships in QPM are supported by satellite models which have more detailed analysis than the highly aggregated level in QPM.

⁵ The traditional methods of estimating a model's parameters through econometric techniques (e.g., ordinary least squares, instrumental variables, etc.) rely on standard measures of statistical inference (including, for example, the parameters' signal-to-noise ratio or t-statistics). When a model is calibrated, certain parameter values are imposed while “fitting” the data. Many of the parameters used in QPM are derived from other empirical studies which are based on traditional econometric techniques. One of the main advantages of calibration is that some of the major difficulties in estimating a large macroeconomic model through traditional econometric methods (including, for example, high simultaneity of the system and the fact that some relevant data may not be directly observable) can be avoided. The principal disadvantage of calibration, however, is that there is no formal metric for rejecting null hypotheses embedded in the model and there is no standard metric to measure “goodness of fit.” (For a review of the key issues in calibration, see, for example, Kydland and Prescott

(continued...)

7. In QPM, current inflation is determined by inflation expectations (modeled as a mixture of backward- and forward-looking components), the relative deviation of output from its potential level, and a term which captures an asymmetry in price movements related to whether there is excess demand or excess supply in the economy. In particular, excess demand is assumed to be more inflationary than excess supply is assumed to be deflationary.⁶ In contrast to more standard linear specifications of the Phillips curve, the asymmetry in the output gap has important implications in that the effects of a shock will depend in part on whether there is excess demand or excess supply in the economy when the shock occurs.

8. QPM also includes a monetary policy reaction function which roughly mimics the Bank of Canada's policy practice.⁷ In particular, the central bank reacts today to predicted deviations of inflation from the target six to eight quarters ahead.⁸ Any forces that create an expected inflation gap will be countered by an increase in short-term interest rates. The central bank acts to influence nominal short-term interest rates, aiming to set a path for the slope of the yield curve that will eventually achieve its objective for inflation. Formally, the link between the yield curve and real economic activity in the model arises because consumption and investment spending are specified as being influenced by the yield spread. Long-term interest rates reflect world interest rates and a specified risk premium.

9. Simulations based on QPM have been found useful in analyzing the effects of a variety of shocks and the impact of various assumptions regarding central bank credibility.⁹ The

⁵ (...continued)

(1996); and Hansen and Heckman (1996)).

⁶ Laxton, Rose, and Tetlow (1993) find evidence of such asymmetry in Canada.

⁷ Specifically, the monetary reaction function in QPM takes the form:

$$R_t^S - R_t^L = \delta(R_{t-1}^S - R_{t-1}^L) + \theta \left[\sum_{i=6}^7 (\pi_{t+i}^e - \pi_{t+i}^T) \right]$$

where R^S is the 3-month commercial paper rate, R^L is the 10-year Government of Canada bond rate, π^e is the rate of inflation expected by the monetary authorities, and π^T is the target rate of inflation. The role of the lagged value of the (inverted) yield spread, $R^S - R^L$, is to smooth the reaction of short-term interest rates to shocks. Coletti, Hunt, Rose, and Tetlow (1996) note that this term can be viewed as reflecting constraints facing the central bank in how fast it can move in responding to shocks and the uncertainty that it faces in interpreting what is happening to the economy.

⁸ In QPM, the actual achievement of the inflation target would take longer (8 to 12 quarters, for most shocks).

⁹ Coletti, Hunt, Rose, and Tetlow (1996) provide examples of quantitative results (relative to control) of various types of shocks in the model's simulations.

effects of various shocks, as discussed below, will largely depend on whether, and to what extent, monetary policy is credible.

10. A simple Phillips-curve framework can be used to examine the role of central bank credibility.¹⁰

$$\pi = \pi^e + b(y - y^*)$$

where $\pi^e = \pi^T$	if full credibility
$\pi^e = a(L)\pi$	if no credibility
$\pi^e = \lambda \pi^T + (1-\lambda)\{a(L)\pi\}$	if less than full credibility

Actual, expected, and target inflation are denoted by π , π^e and π^T , respectively, while $a(L)$ is a polynomial lag function indicating that expected inflation is tied to current and past rates of inflation. The logarithms of output and capacity output are denoted by y and y^* , respectively. Partial credibility would be characterized by expected inflation being linked to a combination of target inflation and past rates of inflation.

11. Because of the lags between the policy action and the rate of inflation, the response of the monetary authorities to shocks to the economy depends on the assessment of the effects of such shocks on the projected rate of inflation. Specifically, the assessment of whether a policy response is necessary requires a judgement on whether the shock comes from the demand side or the supply side, and whether it is likely to be persistent or temporary. It is the effect of shocks on the forecast of inflation relative to the target for inflation that is the crucial determinant of the need for policy action. The policy response to a shock would also depend in part on the degree of credibility of the monetary authorities. This is particularly the case when there is some uncertainty about the nature or the duration of the shock, since the credibility of the central bank will determine the authorities' ability to delay reaction to the shock until more information becomes available.

12. If a *demand shock* is expected to be temporary, its effect on forecast inflation will depend on how the expected rate of inflation would react to the change in the current rate of inflation that occurs in response to the shock. If the central bank is credible, expected inflation is anchored to the target inflation rate, rather than past rates of inflation or new information on shocks affecting the economy. If the monetary authorities lack credibility, expected inflation will respond to movements in actual inflation and, consequently, even a *temporary* change in aggregate demand pressures would lead to a change in forecast inflation. To bring the forecast rate of inflation back to the target in such circumstances would require a change

¹⁰ The response of the Bank of Canada to various types of shocks, highlighting the role of central bank credibility, is discussed in Freedman (1996). The remainder of this section roughly follows Freedman's arguments.

in monetary policy. If a demand shock is viewed by the central bank as *persistent*, it will lead to a change in forecast inflation and will require a change in monetary policy.

13. In the case of *supply* shocks, the greater the credibility of the authorities, the more likely it would be that a one-time price level effect derived from a supply shock would not feed into inflation expectations. The Bank of Canada has made it clear that, while it will not act to reverse the first round of price level effects of a supply shock (for example, an indirect tax change), it will react to any effect on the ongoing rate of inflation (see, for example, Freedman (1996)).

C. The MCI as an Operational Target

14. The transmission mechanism can be understood as the channel through which monetary policy influences the economy; that is, the connection between the instrument(s) that the central bank controls directly and the ultimate policy objective. Because of the long lags and indirect connections between the instrument(s) and the ultimate goal of monetary policy, central banks have found it helpful to make use intermediate targets or indicators. In recent years, the Bank of Canada moved away from the use of monetary aggregates as intermediate targets because financial market liberalization, deregulation, and innovations had led to changes in the financial structure that weakened the link between monetary aggregates and the ultimate target variable. In addition, the Bank of Canada viewed monetary targeting as impractical because large changes in interest rates were required to effect changes to monetary aggregates. After using the narrow monetary aggregate M1 as its intermediate target variable during the period 1975–82, the Bank of Canada has conducted policy without an intermediate target since then. It also has shifted its operational target for monetary policy actions from the short-term interest rate to a monetary condition's index (MCI), which includes short-term interest rates and the exchange rate.¹¹ While not treated as objects to be controlled, the Bank of Canada also makes considerable use of a broad range of various economic and financial indicators (including monetary and credit aggregates and collective wage settlements) to aid in its analysis of current and anticipated economic developments. In

¹¹ Eika, Ericsson, and Nymoen (1996) provide a critical assessment of the use of monetary conditions indices by several central banks. They argue that the value of a monetary conditions index for conducting economic policy is doubtful because it relies on strong assumptions, which have not been thoroughly investigated, about parameter consistency, omitted variables, cointegration, dynamics, and exogeneity. While some of those technical arguments may be valid if the MCI were to be viewed as a long-run fundamental economic relationship, the usefulness of a MCI as a "short-hand," short-term indicator of the stance of monetary policy (as it is used by the Bank of Canada) is not necessarily diminished even if it incorporates certain strong assumptions. In addition, in order to account for these potential problems, the desired path of the MCI is recalibrated with every quarterly update of the Bank of Canada staff's projection.

particular, real M1 has proven to be a useful indicator of output growth one to two quarters ahead, while broader monetary aggregates (such as M2 and M2+) are good leading indicators of the near-term rate of inflation.

15. The Bank of Canada sets a target for the rate of inflation, and given the anticipated inflationary pressures, policy actions are taken to achieve this target. Correspondingly, the Bank sets a provisional path for the monetary condition's index (MCI) as the operational target over the projection period that would be consistent with the achievement of the targeted outcome for inflation. The rationale for adopting the MCI as the operational target is that, given the openness of the Canadian economy, aggregate demand and inflation are influenced by changes in both interest rates and the exchange rate.

16. The role of the MCI as a way of capturing the effects of both short-term interest rates and the exchange rate in the transmission mechanism of monetary policy can be illustrated by the following example. Consider an expansionary demand shock resulting in a deviation of forecast inflation from the inflation target, which may lead to the authorities' decision to tighten monetary conditions. Typically, a tightening of monetary conditions would lead to both a rise in short-term interest rates and an appreciation of the domestic currency. The extent to which interest rates and the exchange rate would change depends on the sensitivity of the exchange rate to movements in relative interest rates. Although both a rise in interest rates and an appreciation of the exchange rate would have similar overall effects on *aggregate* demand, the former would affect predominantly the interest sensitive components of domestic demand, while the latter would affect mainly tradables.

17. The MCI is constructed as a combination of the short-term interest rate and the exchange rate relative to the values of these variables in a base period. It measures the degree of ease or tightening in monetary conditions from this arbitrary date, and no meaning is attached to the *level* of the MCI. The MCI can be calculated in real terms or nominal terms. While the real MCI has the most direct connection with macroeconomic variables, in practice the Bank of Canada focuses more on the nominal MCI because of the lags in the availability of the price data from Canada's main trading partners that are used in calculating real effective exchange rates. The nominal MCI tends to behave similarly to the real MCI for the relatively short horizon over which the MCI is considered to be most useful, in large part at the moment because of the relatively low level of inflation in Canada and its major trading partners.

18. The real MCI is measured as a weighted sum of the change (in percentage points) in the short-term real interest rate (based on the three-month commercial paper rate less a measure of the expected rate of inflation over the three months) and the percentage change in the real effective exchange rate against G-10 countries relative to the base period.¹² The relative weights on the components of the MCI are based on a number of empirical studies

¹² The weight of the U.S. dollar in the effective exchange rate is about 0.82.

that estimate the effect on real aggregate demand over six to eight quarters of changes in real interest rates and the real effective exchange rate. Current estimates place the ratio of those effects at around 1:3 (i.e., over time, a 1 percentage point change in the real interest rate has about the same effect on aggregate demand as a 3 percent change in the real effective exchange rate).

D. The Operational Implementation of Monetary Policy

19. Since June 1994, the Bank of Canada's operational tactics focus on achieving an average level for the overnight interest rate within a 50-basis point target range. The Bank changes its operating range for the overnight rate when it wishes to (or signals a desire to) increase or decrease the level of the MCI, or to rebalance monetary conditions following a significant movement in the exchange rate. Also, the Bank may increase its operating range to stabilize financial markets following unanticipated events, or it may simply ratify movements that have already occurred in the market.¹³

20. Through its influence on the overnight rate, the Bank aims to affect other money market rates and, through expectations, longer term rates and the exchange rate. In addition, movements in the overnight rate affect other money market rates because financial institutions typically carry large inventories of money market securities financed by overnight loans. Changes in the cost-of-carry (the spread between the overnight rate and other short-term interest rates) lead to changes in the profitability of these money market positions and, hence, affect the willingness of market participants to carry these inventories. This would lead in turn to changes in the money market rates.

21. The relationship between movements in the overnight interest rate and movements in the MCI is examined empirically in Barker (1996). He finds that, following the introduction of the Bank of Canada's new operational framework in mid-1994, the major impact of the Bank's operations seems to come from periodic movements in the operating band for the overnight rate rather than from daily fluctuations in the overnight rate. Moreover, the effects on the MCI mostly correspond to changes in the three-month commercial paper rate rather than on the exchange rate.

22. While the Bank of Canada can influence the overnight rate in a number of ways, the management of settlement balances is the principal mechanism used by the Bank to achieve

¹³ The time of the day when a change in the overnight rate occurs can reflect the motivation for the shift. Noël (1995) notes that, generally, changes in the band to reflect economic fundamentals or to rebalance monetary conditions occur at around 9 a.m. Changes in the overnight rate to help stabilize markets can take place at any time during the day.

the desired level of the overnight rate.¹⁴ The Bank is able to exert control over the supply of cash balances by virtue of the fact that the final settlement of all transactions occurs in the direct clearers' accounts on the books of the Bank of Canada, and that the Bank can alter the level of balances by the transfer of deposits between the Government's accounts at the Bank of Canada and those at the directly clearing financial institutions.¹⁵ This transfer is used to neutralize the effect of public sector flows (e.g., government receipts and disbursements) on the financial system as well as to alter the overall supply of settlement balances in order to influence overnight interest rates. The Bank of Canada's operating framework is designed to influence direct clearers to adjust their level of settlement balances on the basis of relative costs. Advances in the form of overdraft loans are charged interest at the Bank Rate and deposits at the Bank of Canada earn no interest. In addition, direct clearers must maintain an average settlement balance of at least zero at the Bank of Canada over a calculation period, or otherwise pay a penalty of Bank Rate on any cumulative deficit. Setting the level of balances above or below the demanded level would exert downward or upward pressure on overnight rates.

23. The Bank of Canada can also influence the overnight rate in several other ways. In particular, when the management of settlement balances alone is insufficient to achieve the desired effect on overnight interest rates, the Bank may supplement its actions through buy-back open market techniques. Open market buyback transactions are typically used to indicate and enforce the upper and lower limits of the Bank of Canada trading range for the overnight rate. Through buyback operations, the Bank can keep most overnight market trading during the day within the target band. Thus, when the overnight rate moves above the ceiling of the band in a persistent manner, the Bank may intervene to add temporary liquidity to the system through Special Purchase and Resale Agreements (SPRAs). Through SPRAs, the Bank of Canada offers to purchase short-term government securities from "jobbers", with an agreement to resell them at a specified price determined by the Bank on the next business day.¹⁶ Conversely, when it appears that the overnight rate will fall below the floor of the

¹⁴ The operational framework at the Bank of Canada has been addressed, inter alia, in Noël (1995), Montador (1995), Clinton (1991), Clinton and Fetting (1989), Howard (1996), Stenger (1994), Farahmand (1995), and Zelmer (1995). Specific procedural details are provided in these sources.

¹⁵ The directly clearing members of the Canadian Payments Association (CPA) maintain accounts with the Bank of Canada in order to settle transactions among themselves.

¹⁶ These transactions are also called "specials" to differentiate them from regular Purchase and Repurchase Agreements (PRAs) which are a form of financing available up to a predetermined limit to dealer jobbers at the Bank Rate, on the initiative of the dealer. PRAs assist dealer jobbers in their overnight financing positions in government securities. However, this facility does not constitute an open market operation since the use of this facility is at the
(continued...)

Bank's target band, the Bank may engage in Sale and Repurchase Agreements (SRAs), which constitute the opposite transaction to SPRAs and, hence, temporarily absorb liquidity from the overnight market.¹⁷

24. On occasion, the Bank also may make outright purchases or sales of treasury bills to pace the movements in money market rates. Because the interest rate used in the monetary condition's index is a three-month interest rate, the Bank of Canada remains sensitive to movements in money market rates, and hence, it may have a view about the pace of the movement in the three-month interest rates, even if it does not feel it is necessary to move its overnight range.

E. Central Bank Credibility

25. A first look at Canada's inflation record since the announcement of inflation targets in 1991 seems to indicate that the Bank of Canada has gained credibility quite rapidly, as the inflation rate came down relatively fast (Chart 1). The CPI inflation rate, which was close to 7 percent at the beginning of the 1990s, came down to 1 percent by mid-1992. However, a careful examination of the data suggests that it took a relatively long time for inflation expectations to decline and that considerable costs, in terms of foregone output and employment, were incurred to bring down inflation.

26. The sharp decline in the inflation rate since 1991 and the relatively stable, low inflation rate since then reflects several factors. First, the inflation rate appears to have come down as a delayed reaction to the economic recession in 1990-91. Second, fiscal policy in Canada has been tightened markedly in recent years, reducing the likelihood of future inflation. However, it might have taken time for the markets to become convinced of the Government's commitment to reducing the fiscal deficit. Third, the substantial improvements in the current account balance that has also taken place in recent years probably made market participants believe that a further depreciation of the currency was unlikely, contributing to lower inflation expectations. Lastly, the achievement of the inflation target and maintenance of the inflation rate within the target range also is likely to have contributed to a lowering of inflation expectations.

¹⁶ (...continued)
discretion of the dealer.

¹⁷ Given that the Bank targets a daily average of the overnight rate, some trades in the overnight market may occur outside of the trading band without prompting central bank intervention. Factors such as the size and concentration of liquidity needs in the market, the length of time since the last intervention on that day, and prospects for the overnight rate to return within the band also play a role in the decision of whether or not to intervene.

27. In order to investigate whether and how quickly central bank credibility has been achieved, different measures have been proposed in the literature.¹⁸ Two of the most recent tests of central bank credibility applied to the Bank of Canada are Amano, Fenton, Tesier, and van Norden (1996) and Johnson (1995). The former groups of researchers at the Bank of Canada find evidence of central bank credibility in Canada based on the market reaction to inflationary surprises. In particular, they find that, for the inflation targeting period beginning in 1991, the reaction of the foreign exchange market to inflation surprises (defined as the release of actual data relative to the expected inflation rate, as per the survey data compiled by Money Market Services International) was consistent with the expectation that the Bank of Canada would raise interest rates (and hence lead to an appreciation of the domestic currency) if inflation turned out to be worse than expected; hence, supporting the view that the Bank of Canada has credibility. Johnson (1995) undertook a formal econometric analysis of the behavior of inflation expectations in Canada based on the Conference Board's survey data and concluded that the announcement of the inflation targets in February 1991, controlling for other factors, had little effect on increasing central bank credibility. He also finds that the announcement of the extended targets in December 1993 and the appointment of a new Governor did not have a significant effect on inflation expectations.

28. In the remainder of this section, several descriptive indicators of central bank credibility in Canada are examined. In particular, direct surveys on inflation expectations show a gradual decline in the expected inflation rate in Canada. For example, based on the Consensus Forecast, both the six- to ten-year ahead expected inflation rate and the average of the three- and five-year ahead expected inflation rates declined from around 4 percent in mid-1990 to 2 percent by 1995 (Chart 2). In recent years, long-term inflation expectations have been quite stable around 2 percent, while the one-year ahead expectations of inflation have fluctuated between 1 and 3 percent—suggesting that the credibility of the inflation target band is now firmly established.

29. The yield curve can also provide an indication of central bank credibility. As the inflation target becomes credibly established, the yield curve should be "flattened" (if the starting point is a high inflation period such as in 1990). However, one of the problems in looking at long-term interest rates is that they reflect not only inflation expectations but also a risk premium for certain political events (e.g., a potential Constitutional crisis) or other economic circumstances (e.g., changes in the outlook for public debt). However, as a first approximation the yield curve, and especially Canada's yield curve relative to that in the United States, can be informative. The U.S. yield curve can be used to control for the uncertainty from a possible common global shock. Chart 3 shows that the slope of the yield curve (defined as the ten-year government bond yield minus the three-month treasury bill rate) has been steeper in Canada than the United States since the second half of 1995, reversing the relationship that had prevailed during much of 1994. Although it is difficult to exactly

¹⁸ A comprehensive survey of these approaches can be found in Amano, Fenton, Tesier, and van Norden (1996).

identify the factors determining the fact that long term interest rates have been relatively high in Canada, one possible interpretation is that the credibility of low inflation over the long-term has not yet been firmly established. However, other factors may also be at work, including a risk premium for political developments.

30. Another measure often used to proxy for expected inflation is the trend in the difference between nominal and indexed bonds. In the case of Canada, this approach is limited by the fact that the market for Canadian indexed bonds is relatively thin. With this proviso in mind, an examination of these data suggests a fairly consistent decline in the market's long-term inflation expectations (Chart 4). The differential between the nominal and real bonds declined from above 4 percent at the beginning 1994 to just over 3 percent by mid-1996. However, the decline is modest in magnitude, and the current differential is indeed higher than the ceiling of the inflation target band.

31. In summary, the various descriptive indicators examined suggest that the credibility of low inflation in the near future has now been established, as evidenced, for example, by survey data. However, longer-term credibility, although difficult to assess precisely, appears to have not yet been firmly established according to the slope of the yield curve and the real-nominal bond yield spread.

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CHART 1
CANADA
INFLATION TARGETS 1/
(Percent change over 12 month period)

Source: Statistics Canada.

1/ Shaded area indicates recession.

INFLATION EXPECTATIONS AT VARIOUS HORIZONS 1/

(Percent)

Source: Based on various surveys of consumer price inflation by Consensus Economics Inc. Reproduced from the *Monetary Policy Report*, Bank of Canada, May 1996 (Page 20), for the period 1990-1995.

1/ Plotted against dates forecasts are made.

CHART 3
CANADA
CANADIAN YIELD CURVE VERSUS UNITED STATES YIELD CURVE
(Percent)

Source: Statistics Canada.

CHART 4
CANADA
REAL RETURN VERSUS NOMINAL GOVERNMENT BOND YIELDS
(Percent)

Source: Statistics Canada.

VII. DEVELOPMENTS IN CANADIAN TRADE POLICY¹

A. Introduction

1. This paper reviews developments in Canadian international trade and investment policies during 1996, including aspects of: (1) the Uruguay Round agreement and the World Trade Organization (WTO); (2) the North American Free Trade Agreement (NAFTA) and the Free Trade Agreement of the Americas (FTAA); (3) the domestic tariff system review; (4) the Asia-Pacific Economic Cooperation Forum (APEC); (5) trade preferences for developing countries; (6) foreign investment policies; (7) internal trade matters; and (8) other measures and issues.

B. Uruguay Round Agreement and the World Trade Organization

Implementation of Uruguay Round

2. At the Quadrilateral trade ministers' meeting on September 26, 1996, Canada supported further consideration of a number of initiatives designed to maintain the momentum of market access liberalization.² Initiatives considered included possible acceleration of Uruguay Round tariff reductions; the examination of zero for zero tariff packages,³ notably on information technology products; and active participation in sector-specific negotiations in financial services, telecommunications, and maritime transportation. Canada was a signatory to the WTO agreement on government procurement, which entered into force on January 1, 1996. It also endorsed within the Quadrilateral Group the initiative to launch broader negotiations among WTO members for an interim arrangement on transparency, openness, and due process in government procurement.

3. The Ministerial meeting of the WTO held in Singapore in December 1996 provided a forum to review progress in the implementation of the Uruguay Round agreement, to assess adherence to the so-called "built in agenda" and to review the status of sector specific

¹ Prepared by Susan Prowse.

² Members of the Quadrilateral Group are Canada, the EU, Japan and the United States.

³ A "zero for zero" tariff package refers to the possible adoption of zero most-favored nation tariffs on every item in an agreed set of goods by all members of the Quadrilateral Group.

negotiations.⁴ Canada encouraged further discussion of the report by the WTO Committee on Trade and Environment and supported the extension of the Committee's mandate.

4. Canada has fulfilled its commitments under the Uruguay Round on Agriculture, although the high tariff rates on products coming under the supply-management system continue to limit the degree of liberalization achieved thus far. With respect to grain marketing, however, legislation currently is being drafted to modernize the governance structure of the Canadian Wheat Board, and a dual marketing system for barley may be introduced.

Dispute-settlement activity in the WTO

5. As of end November 1996, Canada had been involved in 16 cases brought to the WTO Dispute Settlement Body for consultations. Only one request concerned alleged Canadian practices; that request, which was filed by the United States, concerned Canadian practices regarding foreign periodicals. In eight cases Canada was either a sole or a joint complainant; in all other cases, Canada joined consultations initiated by other WTO members.

6. The Canadian Government approved legislation in December 1995 to impose an 80 percent excise tax on the advertising revenues of split-run editions of foreign magazines.⁵ The United States subsequently complained of discriminatory restrictions on foreign magazines, and initiated WTO dispute-settlement procedures against Canada.⁶ The Canadian Government has maintained that the excise tax is a domestic issue, it does not require invocation of the cultural exemption provisions of the NAFTA, and the legislation is WTO-consistent and does not violate Canada's trade obligations with the United States. The United States requested in June 1996 that a WTO dispute-settlement panel be established after consultations failed to produce an agreement. The dispute-settlement panel released its interim

⁴ The "built in agenda" refers to phased commitments to both further negotiations and implementation in specific Uruguay Round agreements.

⁵ Split-run magazines are those publications where the magazine's editorial content is produced abroad and combined with Canadian advertising for sale in Canada. The introduction of the law coincided with the intention by *Sports Illustrated* to transmit its magazine electronically for printing in Canada, and thereby, sidestepping the previous tariff code restriction.

⁶ The U.S. complaint challenged not only Canadian excise tax policies, but also a Canadian postal subsidy (which allows Canada to offer reduced rates to certain Canadian periodicals), the commercial postal rates (under which foreign magazines can be subject to higher postal rates than Canadian magazines), and a tariff provision which prohibits the importation of split-run magazines.

report to the governments of Canada and the United States on January 16, 1997. The final report is expected to be released to WTO members on February 21, 1997.

7. Trade disputes brought to the WTO by Canada, or disputes brought by others in which Canada joined the consultations, include the following: (1) Japan's taxes on alcoholic beverages (filed jointly with the United States and the EU); (2) EU duties on imports of cereals; (3) EU regulations concerning scallops (filed jointly with Chile, Iceland, Japan, and Peru); (4) two separate complaints against Brazil concerning trade and investment in the automotive sector (filed jointly with Japan in one case and the United States in the other); (5) EU measures affecting livestock and meat; (6) Hungarian agricultural export subsidies alleged to have exceeded WTO commitments (filed jointly with Australia, New Zealand, Thailand, and the United States); (7) the EU's ban on imports of beef containing growth hormones; (8) Brazil's export financing program for aircraft; (9) Korean measures affecting bottled water; and (10) Australian import restrictions on salmon.

8. With respect to Japan's internal taxes on alcoholic beverages, Canada alleged that Japan improperly levied a substantially lower tax on certain domestically produced alcoholic beverages than on imported spirits. A panel was established under the dispute settlement system of the WTO and found the higher tax to be discriminatory. While Japan appealed the case, the appellate body upheld the panel's conclusion that the Japanese Liquor Law was contrary to Japan's national treatment obligations under Article III:2 of GATT 1994.⁷ The decision was approved by the dispute settlement body of the WTO in November 1996, and in December 1996, Japan announced changes in its taxes on whiskey to satisfy the WTO complaint. Negotiations between Canada, the European Union, the United States, and Japan are underway to determine a reasonable period of time that Japan should have to implement the proposed changes.

9. Canada suspended its request for WTO consultations over the EU's new system of wheat import duties, after the EU improved Canadian access by raising the duty rebate on high-quality wheat and lowering the quality threshold for durum wheat. The initial agreement, effective for six months until June 30, 1996, was subsequently extended through end-September 1996. Bilateral discussions are continuing. A bilateral agreement also has been reached over French regulations concerning scallops, under which France has agreed to modify the trade description requirements for imported products.

⁷ National treatment refers to the requirement that once a product has legally entered the territory of a country, that product be accorded treatment no less favorable than similar domestically produced goods.

Antidumping and countervailing investigations

10. Canada initiated four antidumping investigations in 1996, and four final determinations were issued, three of which related to cases filed in 1995. In all four final determinations, there was no finding of injury, or the threat of injury, to domestic producers. Three of the four antidumping investigations initiated in 1996 have not resulted in final determinations. A countervailing duty investigation involving dry pasta from Italy, initiated in 1995, also resulted in a finding of no injury, or threat of injury, to domestic producers. However, an appeal to the Federal Court resulted in this decision being set aside and the injury issue has been sent back for redetermination.

C. The North American Free Trade Agreement and the Free Trade Area of the Americas

11. Canada has actively sought to broaden NAFTA membership and has recently concluded an interim bilateral trade accord with Chile that could be integrated into NAFTA. Under the accord, Canada and Chile will provide immediate duty-free access for most industrial goods (which account for 80 percent of Canadian exports) and Chile will eliminate its 11 percent import duty on almost all resource-based goods and a variety of processed agri-food products over five years. In a departure from the NAFTA, the agreement will phase in a mutual exemption from the application of antidumping duties for all goods by no later than 2003. A number of sensitive sectors (including the Canada-U.S. auto pact, Canadian cultural industries, and Canadian supply-managed agricultural products such as dairy, poultry and eggs) were omitted from the accord. The accord established side agreements on environment and labor that mirror those under NAFTA.

12. The NAFTA trilateral working group, established to recommend a new system of rules governing antidumping and countervail, has completed its work. The focus of the group has primarily been on antidumping, with the group waiting to see how the new WTO disciplines on subsidies operate. A final report, however, has not yet been made available to the public. Canada continues to be committed to reform in this area which will more adequately recognize the realities of integrated markets.

13. Canada continues to be committed to the creation of FTAA by 2005. The working groups that were established by the ministerial meeting in 1995 are scheduled to present their recommendations on appropriate procedures and strategy to establish a forum for formal negotiations in 1997.⁸

⁸ For details of the working groups of the Free Trade Area of the Americas, see *Canada - Selected Issues*, SM/96/69, March 20, 1996.

Trade disputes

14. To settle a long-running dispute between Canada and the United States on softwood lumber, an agreement between the two countries was signed on May 2, 1996. The agreement, retroactive to April 1, 1996 requires Canada to place fees on any softwood lumber shipped to the United States from its four leading lumber-producing provinces above 14.7 billion board feet annually, levied at a rate in two tranches of US\$50 or US\$100 per thousand board feet above the threshold. The threshold of 14.7 billion board feet is set below average Canadian exports to the United States over the period 1993 to 1995. In return, the United States agreed not to initiate any further trade actions on Canada's softwood lumber.

15. Canada's commitments on agriculture under the Uruguay Round, which resulted in prohibitively high tariffs (ranging from 175 percent to 350 percent) applied to a number of agricultural products (notably dairy, poultry, eggs, and barley), were challenged by the United States as violating NAFTA by reducing market access for U.S. producers. Following inconclusive consultations between the two countries, the United States requested the establishment of a dispute settlement panel in July 1995 under NAFTA Chapter 20 to examine Canada's application of WTO tariff equivalents for these imports.⁹ The binational panel was established at the end of January 1996 and provided a preliminary decision in July. The panel found in Canada's favor, determining that under NAFTA Canada and the United States agreed that Canada could maintain protection on supply-managed dairy, poultry, and eggs. While Canada's compliance with WTO commitments to establish tariffs on these products changed the form or technique for maintaining limits on access to the Canadian market, it did not reduce market opportunities for U.S. producers.

16. In response to the enactment of the Cuban Liberty and Democratic Solidarity Act (also known as the Helms-Burton Law) by the United States in March 1996, Canada along with Mexico requested consultations under Chapter 20 of the NAFTA.¹⁰ The President of the United States declared a six-month moratorium from the act's original effective date of August 1, 1996 on the right of U.S. citizens to sue in U.S. courts foreign nationals or entities that "traffic" in property previously confiscated from U.S. citizens. On January 3, 1997, the President extended the suspension of the right to sue for an additional six month period. However, the extraterritorial nature of the law has raised serious concerns and opposition from several countries.¹¹ On September 16, 1996, the Canadian government introduced "An

⁹ This was the first panel to be formed under the dispute settlement mechanism in Chapter 20 of the NAFTA.

¹⁰ For further information on the content of the law, see *United States - Selected Issues*, SM/96/169, July 8, 1996.

¹¹ In May 1996, the EU formally requested consultations under the WTO dispute settlement
(continued...)

Act to Amend the Foreign Extraterritorial Measures Act” (Bill C-54). Under this bill, the Canadian Government would be authorized to issue a directive to “block” judgements under foreign laws that are deemed unacceptable by Canada. Foreign laws considered unacceptable would be included in a schedule attached to the Foreign Extraterritorial Measures Act. Consultations between Canada and the United States on the subject are continuing, as are consultations between Canada, Mexico, and the EU to coordinate a response to the U.S. law.

17. There are currently eight active panel reviews under Chapter 19, of the NAFTA, with only one of these (relating to refined sugar) being a review of a Canadian determination that U.S. producers were dumping in Canada. Two panels are currently reviewing antidumping duties imposed by Mexico on Canadian steel shipments.

D. Review of Import Legislation

18. Canada is currently engaged in a comprehensive review of its tariff regime with the intention of increasing transparency, simplifying the system, and streamlining legislation. The proposed tariff schedule incorporates tariff reductions on a wide range of manufacturing inputs classified under some 1,500 tariff lines. Following consultations with the private sector, the new proposals include the elimination or conversion of concessionary tariff codes; the termination of the Machinery Program; the conversion of some specific rates to ad valorem rates; and the elimination or replacement of tariff regulations. Many tariff rates are to be harmonized, and tariff lines amalgamated. Nuisance tariffs (defined as those that are below 2 percent) are to be eliminated, and decimal rates are to be rounded to the nearest half decimal point. The intention is to reduce the total number of ad valorem rates from over 200 to around 50. The Government is also proposing to accelerate to 1998 the implementation of the final Uruguay Round tariff reductions scheduled for January 1, 1999.¹² Legislation is expected to be tabled by early 1997 for full implementation in 1998.

19. The legal framework for filing and processing antidumping complaints is provided for under the Special Import Measures Act (SIMA). Modifications were made to the act in January 1995 to bring it in line with the implementing provisions of the WTO agreement. A Parliamentary review of SIMA was undertaken in 1996 and a report recommending amendments to the law was tabled on December 11, 1996. The recommendations focus on fine tuning the law and strengthening its public interest provisions. The Government will table its response to the report in the Spring of 1997.

¹¹ (...continued)
mechanism.

¹² This would not affect tariff reductions that go beyond 1999, mainly in the agricultural, textile, steel, and apparel sectors.

E. Asia-Pacific Economic Cooperation Forum

20. On November 25, 1996 at the APEC ministerial summit held in the Philippines, members reaffirmed the Group's intentions to make progress toward the goal of "free and open trade and investment" in the region.¹³ To this end, each country submitted an action plan that laid out an agenda for further trade liberalization. The plans primarily covered the period up to 2000, and in most cases, countries moved beyond commitments made in earlier action agendas presented at the Osaka meeting in November 1995. The action plans cover 15 areas, including tariff and nontariff measures, intellectual property rights, product standards and conformance, and competition policy, with implementation of the plans expected to begin in January 1997. In addition, member countries committed themselves to work for an information technology agreement within the WTO that would substantially eliminate tariffs on such goods by 2000. Canada will host the 1997 APEC ministerial summit and strongly endorsed the initiative to eliminate tariffs on information technology products. Canada also agreed to ease restrictions on foreign investment in broadcasting and committed to discuss further liberalization on other products, including nonferrous metals, oilseeds, wood, and fish.

21. Canada believes that APEC offers a mechanism for consensus building on trade and investment liberalization, rather than a means of achieving commitments through negotiated accords. The approach has provided for unilateral undertakings, as well as multilateral actions in a number of cases, and provides a forum to advance a more open regional trading environment.

F. Trade Preferences for Developing Countries

22. The General Preferential Tariff (GPT) provides preferential tariff treatment for imports from developing countries and transition economies. A new schedule of GPT rates became effective on January 1, 1996, and it is scheduled to be fully implemented by 1998.¹⁴ The changes apply to 4,110 GPT rates. Included are around 3,000 reductions in existing GPT rates and 220 new GPT rates on tariff lines not previously included (primarily in agriculture and electrical machinery). The remaining 870 rates reflect zero rates where most-favored nation rates are already free as a result of the Uruguay Round. In most cases, the GPT rates are at least two-thirds of the applied MFN rate.

¹³ On November 15, 1994, at the APEC leaders meeting in Bogor, Indonesia, member countries issued a "Declaration of Common Resolve" to achieve "free and open trade and investment" by 2010 for industrial member countries and by no later than 2020 for developing member countries.

¹⁴ With the reduction in many most-favored nation (MFN) rates under the Uruguay Round agreement, this has eroded GPT margins of preference. The new scheme is intended to restore or, in some cases, widen these margins of preference.

G. Foreign Investment

23. Member countries of the Organization for Economic Cooperation and Development (OECD) are negotiating a Multilateral Agreement on Investment (MAI), open to accession by all countries. The intention is to establish multilateral investment rules requiring, *inter alia*, the provision of equal treatment between foreign and domestic investors and investments, to allow the free transfer of funds, to limit performance requirements imposed on foreign investment, and to allow temporary entry of key personnel. With the objective of concluding an agreement by the Spring of 1997, negotiations have intensified. Canada's goals in the negotiations are basically to replicate NAFTA rules on foreign investment, but to go beyond the NAFTA in certain areas. Canada seeks to make the MAI as attractive as possible to non-OECD countries to encourage accession at the earliest possible date. Reflecting the importance of foreign investment to the economy, Canada also is currently discussing investment issues within APEC and the Free Trade Area of the Americas and has been a major proponent of initiating a work program on investment within the WTO.

24. Until a universal multilateral investment accord is established, Canada will continue to negotiate bilateral Foreign Investment Protection Agreements (FIPAs), which are intended, *inter alia*, to prevent restrictions and expropriation of funds. Canada has negotiated FIPAs with 19 countries, including, the Philippines, Romania, South Africa, Ukraine, and Venezuela. Negotiations are currently taking place with a further 15 countries.

H. Other Measures and Issues

25. Canada signed a free-trade agreement with Israel on July 31, 1996. The agreement will eliminate tariffs bilaterally on virtually all industrial products effective January 1, 1997. In agriculture and fisheries, the agreement calls for duty-free access or low rates of duty for specific items. However, a number exemptions are provided in the agreement, including cultural industries, goods covered by the U.S.-Canada auto pact, and Canada's supply-managed dairy, poultry, and egg products. The agreement provides for emergency safeguard actions during its first two years of implementation, and it includes provisions on competition law and policy to deal with anti-competitive and monopolistic actions by public and private parties.

26. Following the dissolution of the 17-nation Coordinating Committee on Multilateral Export controls in 1994, 31 countries, including Canada, agreed to launch a new export control regime, called the Wassenaar Arrangement.¹⁵ At the plenary meeting held in July 1996, member countries agreed to begin exchanging information on transfers of dual-use goods and

¹⁵ The arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies was established in December 1995. It is based on a commitment by each country to enforce its own export laws.

technologies, as well as conventional arms. Currently, lists in particularly sensitive dual-use goods, armaments and technologies are being exchanged.

27. Canada maintains restrictions on payments and transfers to Iraq (since August 1990) and Serbia and Montenegro (since June 1993 and April 1993, respectively).

VIII. OFFICIAL DEVELOPMENT ASSISTANCE

1. Canada's official development assistance (ODA) to developing countries and multilateral institutions, measured on a Development Assistance Committee (DAC) basis totaled US\$2,311 million in 1995 or 0.42 percent of GNP, compared with 0.43 percent in 1994 and 0.45 percent in 1993 (see tabulation below). The Government is committed to reaching a target for ODA of 0.7 percent over time, as Canada's fiscal situation permits.

Canada: Official Development Assistance 1/						
	1990	1991	1992	1993	1994	1995
(In billions of U.S. dollars)						
<u>Total</u>	<u>2.5</u>	<u>2.6</u>	<u>2.5</u>	<u>2.4</u>	<u>2.3</u>	<u>2.3</u>
Bilateral	1.7	1.8	1.7	1.6	1.5	1.6
Multilateral	0.8	0.8	0.8	0.8	0.8	0.7
(In percent of GNP)						
<u>Total</u>	<u>0.44</u>	<u>0.45</u>	<u>0.46</u>	<u>0.45</u>	<u>0.43</u>	<u>0.42</u>
Bilateral	0.30	0.31	0.31	0.30	0.28	0.29
Multilateral	0.14	0.14	0.15	0.15	0.15	0.13
(In percent of total ODA)						
<u>Total</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Bilateral	68	69	68	67	65	69
Multilateral	32	31	32	33	35	31
1/ Includes traditional ODA measured on a DAC basis, and excludes aid programs for transition economies.						

2. ODA priorities are concentrated within six categories; (1) basic human needs; (2) women in development; (3) infrastructure services; (4) human rights, democracy, and good governance; (5) private sector development; and (6) the environment. Countries in Africa receive the highest share of Canadian ODA, although countries in Asia and the Americas continue to receive support. The intention is to expand assistance in those sectors that are important to both Canada and the developing countries, such as agriculture, forestry, and fisheries. Canada also maintains an active program of assistance to Central and Eastern Europe and countries in the former Soviet Union.