FOR

AGENDA

SM/05/42
Correction 1

February 15, 2005

To: Members of the Executive Board

From: The Secretary

Subject: **Canada—Selected Issues**

The attached factual corrections to SM/05/42 (2/2/05) have been provided by the staff.

Please note that page numbers 35-44 and 101-119 have changed due to overflow of text.

Page 1, para. 1, line 5: for "...D. Botman and S. Danninger..."
                   read "...D. Botman, S. Danninger, and D. Hauner..."

Page 35, para. 1: inserted footnote 24: "The model is not useful, however, for analyzing issues of intergenerational equality."
    para. 3: inserted footnote 25: "Lower levels of international capital mobility would raise the beneficial effects of debt reduction for the Canadian economy, while lowering spill over from tax policy in the rest of the world."

Page 36, para. 1, footnote: for "...[24] Rather than try to model the complexities of actual tax systems, it is assumed that taxes are levied on the relevant base as a single marginal rate, so there is no difference between average and marginal tax rates."
          read "..[26] Rather than try to model the complexities of actual tax systems, it is assumed that taxes are levied on the relevant base as a single marginal rate, so there is no difference between average and marginal tax rates. Were taxes assumed to be progressive, this would lead to small reductions in tax rates and hence distributions."

Page 37, para. 1, line 4: for "...one-fifth for temporary tax cuts broadly in line with other empirical work..."
read "...one-fourth for temporary tax cuts or changes in income, broadly in line with other empirical work."
para. 23, inserted footnote 30: "The baseline also does not take account of future fiscal pressures from population aging. However, as the model is approximately linear, the results would not be significantly altered if the baseline was changed."

Page 92, para. 35, line 3: for "...with the important exception of the United States..."
read "...with the likely exception of the United States..."
para. 48, line 2: for "...with the important exception of the United States..."
read "...with the likely exception of the United States..."
line 6: for "....to the south and hence could be improved, there is a smaller gap than in many other industrial countries."
read "...to the south, any gap is small, particularly when compared to other industrial countries."

Page 102, para. 3, line 2: for "...for around 95 percent of total Canadian deposits..."
read "...for around 90 percent of Canadian deposits..."

Page 103, Box 1, Bullet 2, line 4: for "...not to allow the merger of four of Canada's..."
read "...not to allow two mergers involving four of Canada's..."
Bullet 3, line 2: for "...shares, but left in place the requirement that large banks be widely held, i.e., that no investor..."
read "...shares, and loosened the requirement that large banks be widely held, while retaining the requirement that no investor..."
para. 2, line 4: for "...laws that govern the financial system..."
read "...that governs the financial system...."

Page 107, para. 15, Bullet 2, line 17: for "...Canada's systemically important banks,...."
read "...Canada's important banks,..."

Page 112, para. 1, line 8: for "...which account for about 95 percent of all banking assets."
read "...which account for about 90 percent of all banking assets."
footnote : for "...[78] For example, a recent survey conducted by the Canadian Federation of Independent Business found that public is opposed to bank mergers because consolidation would only exacerbate the already insufficient competition in the industry..."

          read "...[80] For example, a majority of respondents to a recent survey conducted among members of the Canadian Federation of Independent Business and other small land medium-sited enterprises agreed that competition in the financial services sector should increase before additional bank mergers were approved...."

Page 115, para. 12, line 12: for "...is negative, albeit insignificant, which could..."
          read "...is negative, which could suggest the presence of some monopolistic power. Canada is clearly not a case with perfectly monopolistic large banks, given that the H-statistic is not significantly different from zero, but alternative texts confirm that the Panzar-Rosse statistic is valid and not taunted by structural change."

Page 116, para. 14, line 5: for "...suggests that fully competitive conditions only exist in the United Kingdom and Spain..."
          read "...suggests that banking systems in the United Kingdom and Spain are particularly exposed to competition."
          inserted footnote 89: read "For Canada, the market share of the Big Six only takes into account domestic banking assets, excluding foreign subsidiaries and credit unions."

Questions may be referred to Mr. Bayoumi (ext. 36333) and Mr. Mühleisen (ext. 38686) in WHD.

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Att: (27)

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INTERNATIONAL MONETARY FUND

CANADA

Selected Issues

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Approved by the Western Hemisphere Department

February 1, 2005

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impatience, the private sector fully anticipates the future costs of tax changes, leading to the Ricardian result that movements in aggregate demand from changes in taxes or transfers have no impact on spending. Additionally, the model assumes that a certain proportion of wages accrue to "rule-of-thumb" individuals who vary their consumption one-for-one with their post-tax income. Finally, tax rates also distort relative prices, and hence the allocation of resources.[24]

- *Markets are not fully competitive.* Firms and workers have some monopolistic power, implying that prices are above their perfectly competitive levels. The most important consequence of this is that a corporate income tax affects not only the return to capital, but also the economic rent firms are able to extract from their monopolistic power. As a result, corporate income taxes are less distortionary than in the case where these rents do not exist.

- *The remainder of the model can be briefly summarized as follows.* Consumption and production are characterized by constant elasticity of substitution utility/production functions. There are two factors of production, labor and capital, which can be moved across sectors to produce traded or nontraded goods. Investment is driven by a Tobin's Q-relationship, in which firms respond sluggishly to differences between the future discounted value of their profits and the market value of their capital stock. Perfect capital mobility implies that real interest rates in countries are equalized over time.[25] Wages and prices are assumed perfectly flexible, which reduces the short-term aggregate demand impact of fiscal policies. Accordingly, the discussion will focus on medium- and long-term results. This paper uses a two-country version of the model.

20.   *The impact of a tax cut on real activity depends on the response of aggregate supply and demand*. The supply-side effects come through the increase in equilibrium hours worked (as a drop in the wage tax rate raises take home wages) or the capital stock (as a cut in the corporate income tax rate increases post-tax rates of return). The increase in aggregate demand depends on the extent to which individuals view a larger fiscal deficit as an increase in their permanent income, which, in turn, depends on nominal rigidities, the level of impatience, and the proportion of rule-of-thumb consumers. Over the longer-term, these effects spill over to other countries as the global real interest rate rises to re-equilibrate aggregate demand and supply.

21.   *The model was parameterized to reflect the macroeconomic features of Canada and the rest of the world*. The latter is based on the United States, Canada's main trading partner. Canada is about one-tenth of the size of the rest of the world, and hence its policies have only

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[24] The model is not useful, however, for analyzing issues of intergenerational equality.

[25] Lower levels of international capital mobility would raise the beneficial effects of debt reduction for the Canadian economy, while lowering spillover from tax policy in the rest of the world.

a limited impact on the global rate of interest. The ratios relative to GDP of consumption, investment, government spending, wage income, and income from capital correspond to those in Canada and the United States. Canadian exports and imports as a ratio to GDP are set at current values. Tax rates on capital, labor, and consumption have been calibrated to reflect current yields across the two economies.[26]

22.   ***A number of other key behavioral parameters are set equal across the two economies***.[27] In addition to those characterizing real rigidities in investment and the markups of firms, simulations examine the impact of changing the values of the following key parameters:

- ***The Frisch elasticity of labor supply, which measures the sensitivity of labor supply to real wages***. In the baseline, this is set at 0.04, in the mid-range of values produced by microeconomic studies. Alternative simulations assume values of 0.08 and 0.01, around the upper and lower limits of these estimates.

- ***The elasticity of substitution between labor and capital in the production function***. In the baseline, this is set at -0.8, while alternative simulations use values of -0.6 and -1 (the latter is the familiar Cobb-Douglas case, which implies constant shares of income accruing to labor and capital).

- ***The intertemporal elasticity of substitution of consumption, which measures the sensitivity of consumption to changes in the real interest rate***. This is set at -0.33 in the base case, with a lower and upper level of -0.25 and -0.5, again broadly covering the range of microeconomic estimates.

- ***The impatience of forward-looking consumers***. This parameter has not been subject to significant microeconomic analysis. One approach is to consider the gap between interest rates charged to consumers on credit card debt, the main source of unsecured loans in which the lender takes the full risk that consumers may be unable to repay, and government debt. Given the substantial margins seen in this comparison, the private sector discount rate was set some 10 percentage points above the real rate of interest, while simulations are also reported with wedges of 5 percentage points and 15 percentage points.

- ***The proportion of wages associated with "rule-of-thumb" consumers***. In the base case, this parameter was set at 10 percent, being raised to 20 percent and set to zero in alternative simulations. At the macroeconomic level, consumption is known to be

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[26] Rather than try to model the complexities of actual tax systems, it is assumed that taxes are levied on the relevant base as a single marginal rate, so there is no difference between average and marginal tax rates. Were taxes assumed to be progressive, this would lead to small reductions in tax rates and hence distortions.

[27] See Laxton and Pesenti (2003) for a more detailed discussion of evidence on parameter values.

relatively sensitive to changes in disposable income, although some of this comes from the impatience of forward-looking consumers discussed above. In the base parameterization, the assumptions about impatience and rule-of-thumb consumers imply a multiplier of around one-fourth for temporary tax cuts or changes in income, broadly in line with other empirical work.[28]

C. Results of Cutting Transfers and Lowering Taxes Immediately or Later

23.   ***This section compares the consequences of matching a cut in transfers with an immediate tax cut versus a larger tax cut that occurs later.*** The simulations assume that room for tax cuts is provided by a permanent cut in lump-sum transfer payments of one percentage point of GDP. [29] The results compare the following two policy responses: (i) immediately implementing a permanent cut in tax rates so as to reduce tax revenues by the same amount as the cut in transfer payments; and (ii) leaving tax rates unchanged for 10 years, followed by a larger permanent cut in tax rates made possible by the lower level of interest costs due to the intervening fall in the government debt ratio. In the second scenario, the government ends up with permanently lower tax rate and levels of government debt, but at the cost of not offsetting the negative short-term impact of the cut in transfers on aggregate demand. While such scenarios are clearly stylized—in practice, the main reason for reducing government debt at present is to prepare for the future pressures on government spending from population aging—they help illustrate the effects of choosing to cut taxes or reduce debt in a simple and intuitive manner.[30]

Figure 1. Effects on Real GDP of Reducing Transfers and Cutting Wage Tax Immediately and with a Delay

(percent deviation from baseline)
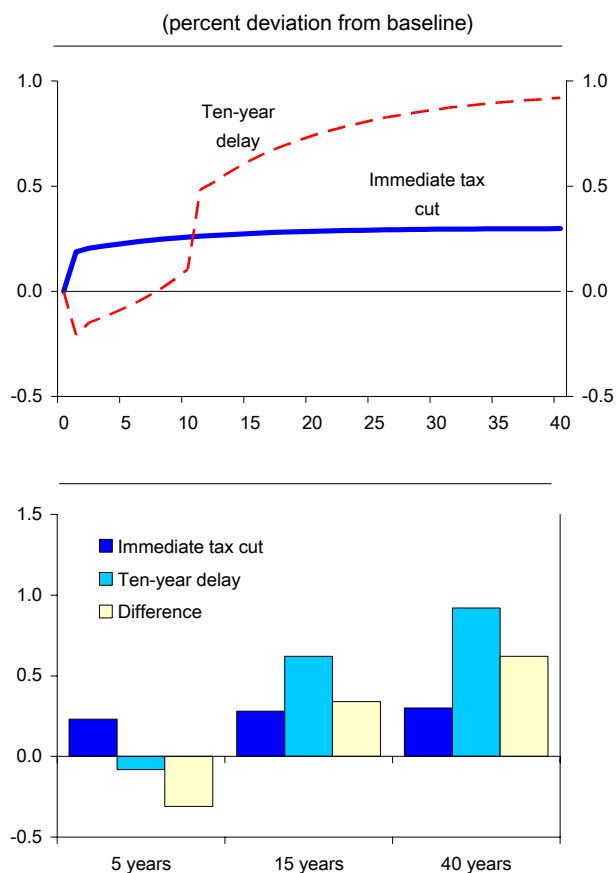
Source: Fund staff calculations.

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[28] For a discussion of current evidence on fiscal multipliers, see IMF (2004).

[29] Lump-sum transfers have no impact on incentives, and hence allow a focus on the distortions caused by tax rates.

[30] The baseline also does not take account of future fiscal pressures from population aging. However, as the model is approximately linear, the results would not be significantly altered if the baseline was changed.

24.   ***Results for the base parameterization suggest that there are significant long-term benefits to delaying a cut in wage taxes, but there are also costs to not offsetting the fall in transfers in the short term*** (Figure 1). Immediately replacing a one percentage point of GDP reduction in lump sum transfers with a cut in wage taxes leads to a 0.3 percent increase in real GDP. About two-thirds of this boost occurs relatively rapidly, as the reduction in taxes leads to a boost in hours worked, while the remainder accumulates more slowly as the capital stock rises. Delaying the cut in wage taxes by 10 years results in a small fall in real GDP after 5 years as the impact on aggregate demand of the reduction in transfer payments is not offset, but also leads to an eventual tax rate reduction that is one-and-a-half times larger than when taxes are cut immediately. Once implemented, the larger tax cut leads to real GDP gains that rise gradually from double to triple those with an immediate tax cut.

25.   ***Cuts in corporate income taxes produce larger benefits that accumulate more slowly over time, while delaying cuts produce a similar ratio of losses and benefits*** (Figure 2). Replacing an immediate cut in wage taxes with a cut in corporate income taxes leads to a similar gain in real GDP after 5 years and a much larger gain over time as capital is accumulated. The larger long-term benefits from a cut in corporate income taxes compared to wage taxes reflects the fact that the corporate tax is more distortionary as the supply of capital (which can be easily reproduced) is more elastic than that of labor—a standard result in the literature. [31] Delaying the cut in taxes for 10 years again implies forgoing significant benefits to real GDP over the first 5 years in return for reaping benefits that are of the order of double the base case beyond ten years.

26.   ***A key advantage of a model such as GFM with well-defined microeconomic foundations is that the implications of alternative behavioral assumptions can be examined***. Figure 3 reports the change in real GDP after 5 years, 15 years, and 40 years when wage taxes are cut immediately, after 10 years, and the difference between these two values for a range of parameter values. The results after 5 years can be interpreted as the medium-term effect of the cut in spending and

Figure 2. Effects on Real GDP of Reducing Transfers and Cutting Corporate Income Taxes Immediately and with a Delay

(percent deviation from baseline)
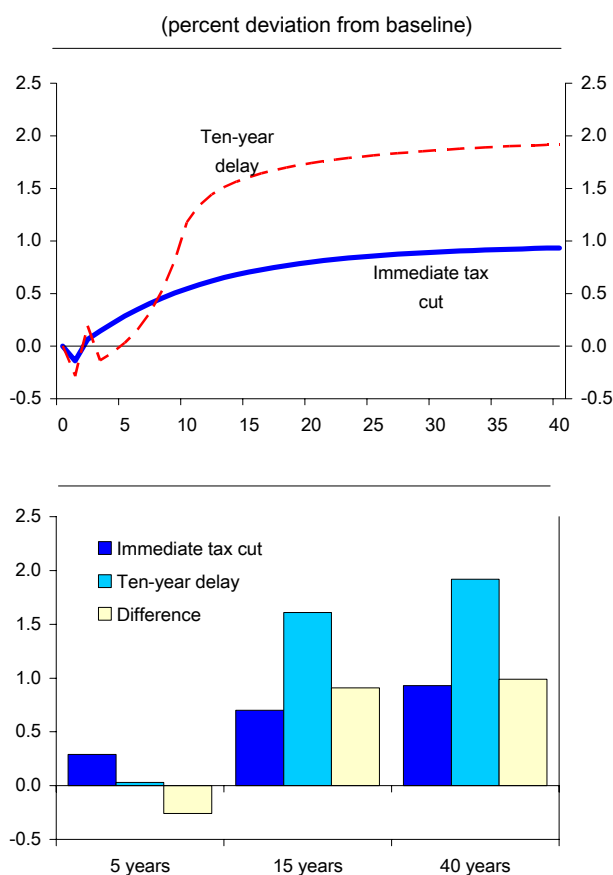
Source: Fund staff calculations.

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[31] For a Canadian application, see Finance Canada (2004).

Figure 3. Effects of Alternative Parameterizations on Impact of a Cut in Transfers and in the Wage Tax Rate on Real GDP
(percent deviation from baseline)

Higher Frisch elasticity of labor supply (elasticity = 0.08)

Immediate tax cut
Ten-year delay
Difference

Lower absolute Frisch elasticity of labor supply (elasticity = 0.01)

Higher absolute elasticity of substitution between labor and capital (elasticity = -1)

Lower absolute elasticity of substitution between labor and capital (elasticity = -0.6)

Higher absolute intertemporal elasticity of substitution of consumption (elasticity = -0.5)

Lower absolute intertemporal elasticity of substitution of consumption (elasticity = -0.25)

More impatient consumers (wedge is 15 percentage points)

Less impatient consumers (wedge is 5 percentage points)

Source: Fund staff calculations.

(if implemented) the tax cut, those after 15 years represent the medium-term impact of a delayed tax cut, while the results after 40 years represent the long-term impact of alternative scenarios.

27.   ***The results indicate that the Frisch elasticity of labor supply largely determines the overall size of the wage tax distortion***. The benefits from immediate cuts in wage taxes vary approximately proportionally with the value of the Frisch elasticity of labor supply, for example, approximately doubling when it is raised from 0.04 to 0.08. This is because the elasticity determines the response of hours worked to changes in post-tax real incomes and hence the distortion to labor supply. No other parameter has a significant effect on the impact of an immediate cut in wage taxes.

28.   ***The Frisch elasticity also has a proportional impact on the dynamic benefits of delaying wage tax cuts, while the ratio of short-term losses to long-term benefits rises as consumption becomes less sensitive to the real interest rate***. The difference in the changes in real GDP implied by the different timing of tax cuts again vary approximately proportionately with the size of the Frisch elasticity. In addition, the ratio of longer-term benefits from delayed tax cuts to short-term losses rises when consumption is less sensitive to real interest rates as it induces a larger fall in the real interest rate and a greater rise in the capital stock. This occurs when the intertemporal elasticity of consumption is reduced and when forward-looking consumers are made more impatient. Increasing the elasticity of substitution between labor and capital also raises this ratio as it increases the response of the capital stock to changes in labor supply. Finally, changing the proportion of rule-of-thumb consumers had little impact on the path of real GDP (and is not reported).

The key parameter for a corporate income tax is the elasticity of substitution between capital and labor, while changes in the sensitivity of consumption to real interest rates again matter for the dynamic responses (Figure 4). The higher the elasticity of substitution between labor and capital, the greater the incentive for firms to respond to a tax cut by raising the capital stock, and hence the larger the benefits of a delayed tax cut. In addition, the larger impact on the real interest rate from reducing the sensitivity of consumption to the real interest rate again raises the dynamic benefits of a tax cut. By contrast, changes in the Frisch elasticity and the proportion of rule-of-thumb consumers have little impact on the simulations.

D. Fiscal Spillovers

29.   ***The model can also be used to examine issues of fiscal spillovers across countries***. As in the earlier section, a highly stylized scenario designed to illustrate the impact of tax competition on the Canadian economy is examined. In particular, it is assumed that there is a wage or corporate income tax rate cut in the rest of the world that lowers revenues by a percentage point of GDP and leads to larger fiscal deficits. After 5 years, this tax cut is rescinded and replaced by a permanent tax rate increase that generates sufficient revenues to cover the additional interest costs incurred by the intervening rise in government debt. The simulations first examine the impact on the Canadian economy assuming no response by the tax authorities, and then the results if the Canadian authorities follow the rest of the world in cutting, and then later raising, the same tax rate.

Figure 4. Effects of Alternative Parameterizations on Impact of a Cut in Transfers and in the Corporate Income Tax Rate on Real GDP

(percent deviation from baseline)
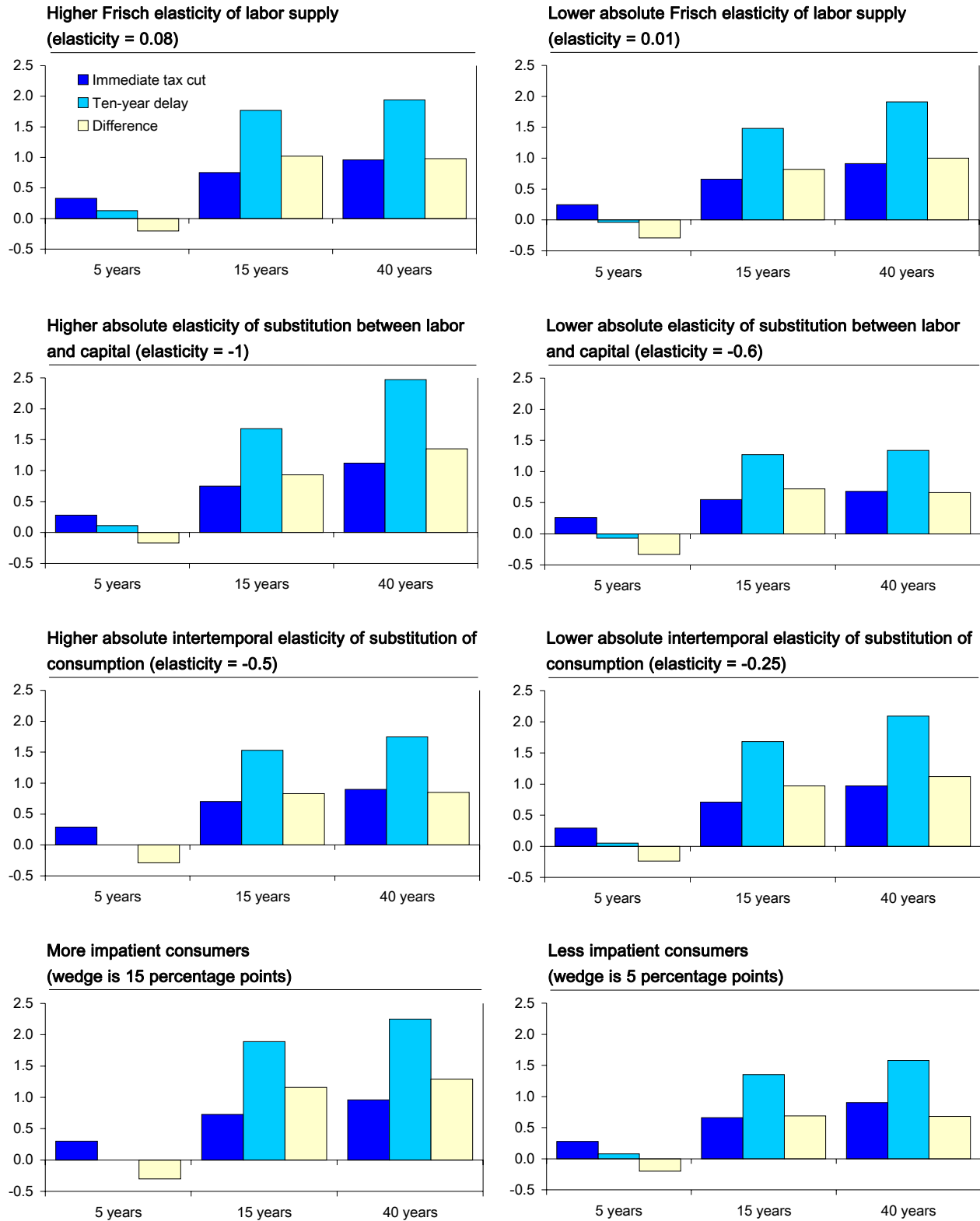
30.   ***The results suggest that fiscal spillovers from tax cuts in the rest of the world can be significant and rise over time*** (Figure 5). A temporary cut in wage taxes in the rest of the world equivalent to a one percentage point of their GDP is followed by subsequent increase of the order to one-quarter of this amount. The loss to Canadian and global GDP is of the order of three-quarters of a percent after 15 years. The losses accumulate gradually over time, as global real interest rates rise by around a half percentage point and crowd out investment in response to the 8 percentage point of GDP increase in rest of the world government debt.[32] The resulting losses to real GDP for equivalent changes in corporate income taxes are somewhat larger, reflecting the fact that corporate tax rate increases are more distortionary, but the basic mechanisms are similar.

31.   ***The Canadian government can mitigate the medium-term effects of fiscal spillovers by matching foreign taxes cuts, but only at the cost of larger long-term costs to real GDP***. These results broadly mirror those found earlier about the benefits and costs of immediate and delayed tax cuts. However, as the main effect on Canada occurs through the global rate of interest, rather than differences in tax rates across countries, Canada's own tax policy has only a limited impact on the long-term losses in output. This observation applies more to wage tax cuts than corporate income tax cuts, as the latter involve larger domestic distortions.

32.   ***These results reflect a range of assumptions about the structure and behavior of the global economy***. It should be emphasized that the impact of fiscal policies in individual countries would be smaller for the rest of the world, as they would have a lesser impact on global debt and real interest rates. In addition, the size of fiscal spillovers is an area of

Figure 5. Impact of Tax Spillovers from the Rest of the World

Temporary Cut in Wage Tax in the Rest of the World

Temporary Cut in Corporate Income Tax in the Rest of the World
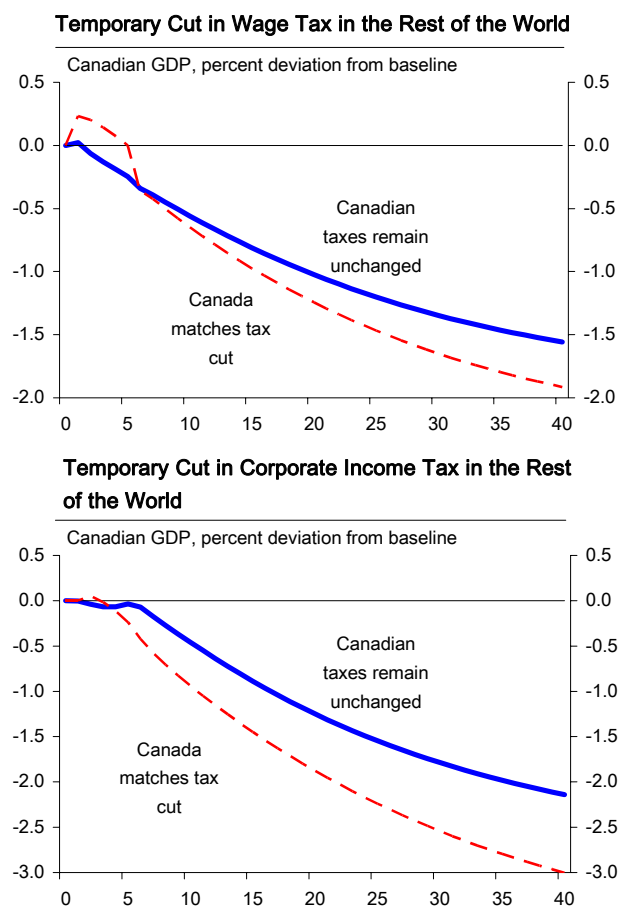
Source: Fund staff calculations.

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[32] This is broadly consistent with results reported in IMF (2004), which finds that a percentage point rise in the U.S. fiscal deficit raises interest rates by up to ½ percentage point (i.e. recalling that the United States represents about one-third of global GDP at market prices), as well as the rule of thumb of Elmendorf and Mankiw (1999), that are rise in government debt lowers the capital stock by an approximately equal amount.

considerable controversy, and these simulations are only one approach to answering this question.[33]

E. Conclusions

33. ***The conclusions of this analysis can be summarized as follows***:

*   ***There are significant potential benefits to reducing government debt by delaying tax cuts***. In the base case, delaying tax reductions 10 years at the costs of short-term losses in output doubles the medium-term gains to real GDP of the eventual tax cut and the long-term benefits can be even larger.

*   ***A corporate income tax cut provides significantly greater benefits over time than a wage tax cut***. This is because capital is a more mobile factor of production, and hence more responsive to changes in incentives.

*   ***The key parameters that determine the benefits of delaying tax cuts are the Frisch elasticity of labor supply for a wage tax and the elasticity of substitution between labor and capital for a corporate tax cut***. In addition, the ratio of losses and benefits to real GDP rise as the response of consumption to real interest rates is reduced or consumer impatience rises, as this boosts the long-term impact on the capital stock.

*   ***International fiscal spillovers can be significant, with much of the impact coming through the global rate of interest, rather than differences in tax rates across countries***. This limits the effectiveness of Canadian policies in reducing these spillovers, particularly for wage taxes.

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Elmendorf, D.W., and N.G. Mankiw, 1999, "Government Debt," in *Handbook of Macroeconomics*, Vol. 1c, edited by J.B. Taylor and M. Woodford (Amsterdam: Elsevier Science).

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[33] See IMF (2004) for a discussion of these issues.

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V. HOW FLEXIBLE IS THE CANADIAN ECONOMY? AN INTERNATIONAL COMPARISON[63]

A. Introduction

34.   ***The openness of the Canadian economy leaves it susceptible to external shocks and puts a premium on economic adaptability***. Accordingly, this paper compares the degree of flexibility of Canadian economy with that of other major industrialized countries. Flexibility is an important economic concept, but a difficult one to measure. Rather than focusing on one approach, this paper uses a range of different measures of economic adaptability:

- ***Industry-level data on real value added*** is used to compare the degree to which countries have changed their economic structure, both over long periods of time and from year to year. The latter is a measure of the amount to which resources flows across sectors in response to changes in economic conditions, which can be characterized as economic "churning."

- ***A survey of microeconomic studies*** compares rates of entry and exit of individual firms as well as gross job creation and destruction across industrial countries, and supplement the industry-level analysis of churning

- ***Estimates of Phillips curves across countries*** measure the speed with which the economy responds to macroeconomic disturbances.

35.   ***The results uniformly suggest that Canada is characterized by a relatively high degree of flexibility, of magnitude comparable if not larger than many other industrialized countries, with the likely exception of the United States.*** Industry-level data suggest Canada has undergone a deep transformation of its industrial structure over the last 20 years and that it has been able to respond rapidly from year to year to changing circumstances. In addition, a relatively large number of firms enter and exit the market every year, while the share of gross jobs created and lost in the Canadian manufacturing sector every year has been comparable to that in the United States. Phillips curves also point to a relatively strong ability to respond to macroeconomic disturbances.

B. Industry Data

36.   ***The Canadian economy has undergone substantial structural changes over the past 20 years, largely reflecting the declining importance of the primary sector***. Figure 1 shows that the share of value added of the Agriculture and Mining sectors has declined more rapidly in Canada than in other industrialized countries over this period (Figure 1). In contrast with other countries, the manufacturing sector's share has increased over time, while the service sector's share has not increased as rapidly.

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[63] Prepared by Tamim Bayoumi and Roberto Cardarelli (RES).

Figure 1. Sectoral Change Across Countries

Agriculture

share of value added, in percent

Canada

Euro Area

Japan

United States

United Kingdom

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000

Mining

share of value added, in percent

United Kingdom

United States

Canada

Euro Area

Japan

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000

Manufacturing

share of value added, in percent

Euro Area

Japan

United Kingdom

Canada

United States

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000

Services

share of value added, in percent

United States

Canada

Japan

Euro Area

United Kingdom

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000

Source: OECD, Structural Analysis Database.

37. *Standard indexes suggest that Canada has been relatively successful in shifting resources across sectors*. Two measures of structural change in response to disturbances are the Structural Change Index (SCI), which measures changes over extended periods, and the Lilien index, which focuses more on short-term churning (Box 1, Table 1). The Lilien Index suggests that Canada has experienced more churning across sectors than other G-7 countries, as well as the Netherlands, and Spain, but Canada scores lower on the SCI measure of long-term structural change.[64]

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[64] Germany is excluded from the comparison due to the impact of reunification.

46.   ***Canada's results are similar to most of the other non-European economies***.
Canada's coefficient on forward-looking inflation is 0.67, slightly higher than those found for
the United States and Australia, but, given the standard errors on the coefficient estimates,
these differences could well reflect noise. The most surprising result given the earlier
analysis is the extremely high coefficient on forward-looking inflation in Japan. This could
well reflect the relatively flexible wage structure, where almost one-third of overall wages
comprise annual bonuses that vary with the state of the economy. However, this flexibility
has to be seen in the context of the "jobs-for-life" environment that limited real flexibility,
helping to explain why Japan appears to be less flexible in the microeconomic analysis
discussed in earlier sections.

47.   ***IS curves were also estimated to examine whether there were any systemic
differences in the response of aggregate demand, but no patterns were found***. The IS curve
relates the current level of the output gap to its expected future and past values (with the
coefficients constrained to sum to unity), as well as the level of real interest rates.[70]
Estimated equations could reveal differences in flexibility—for example, using similar
arguments to those used for the Phillips curve, more flexible economies might have lower
coefficients on lagged output gap. However, the results (not shown) indicated remarkable
stability in the coefficients across countries, with most estimates of the coefficient on the
lagged output gap being close to one-half and real interest rate effects being small and
insignificantly different across countries.

E.   Conclusions

48.   ***The results in the paper suggest that Canada has a relatively flexible economy
compared with other major industrial countries, with the likely exception of the United
States.*** This conclusion comes from measures of economic flexibility using a range of
approaches, including the response of output at the sectoral level, microeconomic studies of
firm behavior, and from macroeconomic relationships. It suggests that, while on a number of
measures the flexibility of the Canadian economy is lower than that of its neighbor to the
south, any gap is small, particularly when compared to other industrial countries.

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        Destruction in Canada and the United States," *The Review of Economics and
        Statistics*, Vol. 80, pp. 347–56.

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        Demographics and Survival: Micro-Level Evidence for the OECD Countries," OECD
        Economics Department Working Paper No. 348 (Paris: Organization for Economic
        Cooperation and Development).

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[70] Such a specification can be derived from the Euler equation of consumption with habit persistence in
preferences.

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PART IV: FINANCIAL SECTOR ISSUES

VI.   LARGE BANKING GROUPS AND FINANCIAL SYSTEM SOUNDNESS[71]

A.   Overview

1.   ***This paper uses market-based soundness indicators to assess the stability implications of the rapid growth and shifting business strategies of Canada's large banking groups***. Helped by changes in the regulatory framework, a process of mergers and acquisitions has led to the emergence of six large banking groups (LBGs) that account for a large share of the Canadian financial system. Over the past twenty years, the LBGs have been diversifying income and balance sheets by reducing the share of traditional deposit and lending activities and taking on more exposure to domestic and international financial markets. The soundness measures presented in this paper—based on so-called "distance-to-default" models—suggest that the rapid growth of the LBGs in the second half of the 1990s was associated with a significant increase in their overall risk profile. More recently, however, LBGs' risk-adjusted returns appear to have improved, and soundness has been further underpinned by ongoing increases in capital adequacy ratios.

2.   ***The recent strong performance of the LBGs speaks to a high degree of resilience of the Canadian financial system***. In 2001, financial market weakness following the demise of the high-tech stock market bubble and the global slowdown affected LBG performance. However, bank profitability has since recovered and other financial soundness indicators have continued to strengthen from already comfortable levels. Moreover, the relatively modest rise in default risk during the recent slowdown, compared with that during the Russian, Brazilian and LTCM crises of the late 1990s, suggests a strengthening of risk management practices on the part of the LBGs.

B.   Banking Sector Trends

3.   ***The Canadian banking sector is highly concentrated***. The six major LBGs account for around 90 percent of Canadian deposits and banking assets. Based on mid-2004 balance sheet data, the largest LBG accounts for almost 25 percent of total banking assets, followed by four institutions each holding close to 15 percent of total assets. The sixth LBG accounts for about 5 percent of total assets.

4.   ***The LBGs went through a rapid growth spell in the second half of the 1990s, partly in response to recent legislative changes*** (Box 1). From end-1996 to end-2001, their deposit base and total assets expanded by more than 50 percent. On the asset side, investments were channeled in particular into securities and mortgages. In recent years, however, balance sheet expansion has slowed down dramatically, in part for cyclical reasons.

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[71] Prepared by Gianni De Nicoló, Alexander Tieman, and Robert Corker, with research assistance from Marianne El-Khoury. All were in MFD at the time of writing.

Box 1. Changes to Canada's Financial Sector Legislation

The rapid growth of LBGs has been facilitated by changes to Canada's financial sector legislation:

- Amendments to the regulatory framework in 1987 and 1992 removed legal barriers separating the activities of various types of financial institutions, allowing Canadian financial institutions to develop into financial conglomerates (Freedman, 1998).

- In 2001, limitations on investment in non-financial business were also relaxed, together with the introduction of a holding company regime. At the same time, a new merger-review policy was introduced, mainly in response to the government's 1998 decision not to allow two mergers involving four of Canada's largest banks (Ministry of Finance, 1998; Group of Ten, 2001).

- The new policy raised the ownership limit to 20 percent for voting shares and 30 percent for non-voting shares, and loosened the requirement that large banks be widely held, while retaining the requirement that no investor hold a majority share in the bank (Daniel, 2002).

The Canadian regulatory and supervisory regime is subject to regular reviews in order to keep pace with the changing technological and market environment. Canada's financial legislation contains sunset clauses that prescribe periodic reassessments and updating of the regulatory framework that governs the financial system. In the past, the review used to take place once every ten years. In 1992, the review period was shortened to five years and extended to the legislation governing all federal financial institutions.

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5.   ***LBGs' investment behavior since the mid-1990s is the continuation of a longer trend reflecting the expansion of their fee-earning business***. As part of their growth and diversification strategy, LBGs have been acquiring mortgage loan companies, securities businesses, and trust companies (Calmès, 2004). Through this process, they have expanded their links to financial markets and, in particular, their exposure to equity markets. In mid-2004, securities accounted for 27 percent of totalassets, compared with 19 percent at the end of 1996 (Table 1).[72]

6.   ***The LBGs have also acquired substantial foreign investments***. Consistent with many analysts' view that the Canadian market does not offer sufficient banking economies of scale, LBGs have sought to expand their business abroad. Over the past 10 years, LBGs' foreign securities holdings have grown at roughly three times the pace of domestic securities. While accumulating large U.S. dollar exposures in general, LBGs have also acquired extensive direct investments in the United States and the Caribbean.

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[72] This reflects an increase in the share of assets devoted to securities for all except one LBG.

Table 1: Balance Sheet Items of Six Large Banking Groups (In percent, unless otherwise noted)						
	Dec-96	Dec-00	Dec-01	Dec-02	Dec-03	Jun-04
Total assets						
In billions of C$	1,015	1,438	1,587	1,628	1,627	1,671
Annual percent change		9.1 3/	10.4	2.6	-0.1	2.7
As percent of GDP	121.3	133.5	143.2	140.6	133.5	129.4
Aggregate balance sheet shares						
Assets						
Securities	19.0	23.4	25.2	24.7	27.4	26.8
Non-mortgage loans	41.0	37.2	36.0	34.6	31.0	32.7
Mortgage loans	19.9	19.3	19.3	20.0	21.2	21.4
Other	20.1	20.1	19.5	20.7	20.4	19.1
Liabilities						
Deposits	68.2	67.6	66.6	66.1	65.8	67.1
Other	31.8	32.4	33.4	33.9	34.2	32.9
Net income before tax 1/	1.0	1.0	0.8	0.6	0.9	1.2
Net interest income/total net income	60.6	39.5	40.9	43.6	47.9	47.2
Capital adequacy ratio 2/	9.2	11.7	12.3	12.3	13.3	13.4

Source: Office of the Superintendent of Financial Institutions.
1/ As percent of total assets.
2/ In percent of risk-weighted assets.
3/ Average annual percentage change 1996–2000.

7.   ***The counterpart to this portfolio shift has been a sharp decline in the relative importance of LBGs' traditional lending business, excluding mortgages***. Increases in non-mortgage lending have barely kept pace with inflation since the mid-1990s, notwithstanding rapid growth in LBGs' deposit base. This has only partly been offset by mortgage lending that has expanded in line with, or even faster than the total asset base. As a result, LBGs' net interest income now accounts for less than half of total net income compared with about 60 percent in the mid-1990s.

8.   ***These trends and strategies of large banking groups are not unique to Canada***. Most of the large financial institutions in the United States and elsewhere have expanded their securities and mortgage business, and consequently derive a greater share of their income from fees and other non-interest sources (IMF, 2004).

9.   ***Foreign and financial market exposures contributed to significant strains in the banking sector after the bursting of the stock market bubble***. Although the downturn of the Canadian economy was relatively mild, non-interest income growth dropped from over 25 percent per year between 1996 and 2000 to virtually zero between 2001 and 2003 (Figure 1). With impaired assets and loan loss provisions up sharply, return on equity for the banking system as a whole fell from 15.8 percent in 1999 to 9.4 percent in 2002, but has since rebounded (Table 2).

10.   ***Nevertheless, throughout both the growth spell and subsequent slowdown, LBGs continued to build up capital relative to risk-weighted assets***. Total LBG capital increased by about 70 percent between 1996 and 2001, translating into a rise in the average capital ratio from 9.2 percent to 12.3 percent. Following a drop in both capital and risk-weighted assets in 2002, the average capital ratio increased to 13.3 percent in 2003, boosted by increases in capital and a further decline in risk-weighted assets. Throughout the

Figure 1. Growth of income components of LBGs

Source: OSFI.

period, all banks remained substantially above the minimum capital requirements set in the 1988 Basel capital accords.
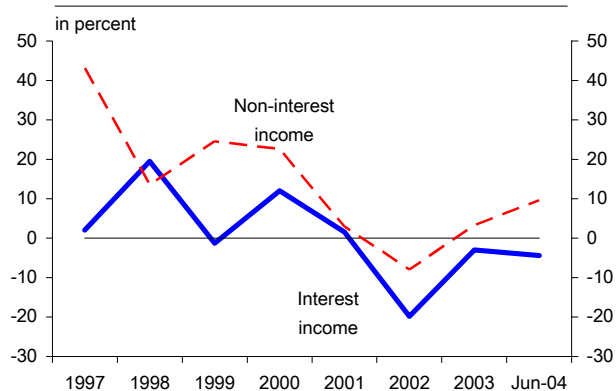
Table 2. Vulnerability Indicators of the Banking System 1/							
	1997	1998	1999	2000	2001	2002	2003
Balance sheet							
Total loans to assets (percent)	62.8	58.4	58.7	57.7	55.8	55.6	53.8
Total loans to deposits (percent)	92.5	90.2	86.8	84.2	84.5	83.1	81.3
Impaired assets/total assets	0.68	0.66	0.59	0.60	0.84	0.90	0.64
Loan loss provision (in percent of total assets)	0.18	0.20	0.23	0.27	0.37	0.57	0.23
Total foreign currency assets/total assets 2/	41.5	46.4	40.2	40.5	42.7	41.4	36.2
Total foreign currency liabilities/total assets 2/	43.5	47.7	42.4	42.2	44.7	43.8	37.7
Total foreign currency deposits/total assets 2/	30.7	32.2	31.3	29.5	30.4	28.9	25.6
Profitability							
Return on total shareholders' equity (percent)	16.4	13.4	15.8	15.3	13.9	9.4	14.7
Return on average assets	0.71	0.57	0.71	0.72	0.66	0.44	0.69
Average intermediation spread	2.9	2.6	2.7	2.9	3.0	3.0	3.1
Net interest income (in percent of avg. total assets)	2.1	1.8	1.8	1.8	1.9	2.0	1.9

Sources: Bloomberg; Canadian Bankers Association; Haver Analytics; and Office of the Superintendent of Financial Institutions.
1/ Unless otherwise indicated, based on data reported by the six largest chartered Canadian banks, which account for some 90 percent of the total market share.
2/ All chartered banks.

11.   ***LBGs have also reduced their off-balance sheet activities***. Prior to 1998, LBGs took on increasing exposures in the derivatives markets as well as boosting other off-balance sheet exposures. These were scaled back in subsequent years, following the Russia and Brazil crises and the LTCM collapse. With one exception, the LBGs have not expanded—and in some cases made further sizable contractions in—their off-balance sheet activity since 1999.

12.   ***Despite similar features, the business strategies of the six LBGs have not been identical and financial performance has been varied***. The largest and one of the mid-tier

LBGs deviated from the other institutions in that they built up their securities portfolio share more rapidly and reduced their share of mortgage loans. The financial performance of these two institutions has been quite different. The largest bank appeared to weather the post-2000 slowdown relatively comfortably, whereas profitability in the other bank—which had the fastest growing balance sheet and the most rapid buildup of securities investments of all LBGs—was quite volatile, culminating in pre-tax losses in 2002. One other LBG—the one with the fastest growing exposure to the mortgage market—also saw its profits fall to a very low level in 2002, whereas the other three institutions experienced only mild dips in profitability.

C. Market-Based Financial Soundness Indicators

13.   ***Business strategies of the LBGs affect both the financial soundness of the individual institutions and that of the financial system as a whole***. Increased diversification, both internationally and across different business lines, should in principle yield better risk profiles for financial institutions. But when diversification takes place at the expense of lower capital or profitability, or increased earnings volatility, financial soundness may not necessarily improve—as reflected in the recent performance of individual banks. Moreover, were all LBGs to diversify in the same direction, systemic vulnerability (i.e., the risk of several banks experiencing distress at the same time) to large, common shocks could increase even if each bank individually was better hedged against risks.

14.   ***This section evaluates trends in Canada's financial system vulnerability using a market-based soundness indicator***. The indicator, which was estimated for the period 1991–2003, is based on distance-to-default (DD) models commonly used in the finance literature and increasingly reported in central bank financial stability reports. DD is a composite measure computed as the sum of the return on the estimated market value of assets and the capital-to-assets ratio at market prices, divided by the volatility of assets.[73] It thus combines measures of profitability, balance sheet strength, and market uncertainty. A higher DD indicates an improvement in financial soundness at the company level, for example because of improved profitability, a higher capital ratio, or reduced volatility—or a combination of all three.[74] Although DD measures are sensitive to variations in the underlying assumptions,

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[73] Estimates of the market value of assets are based on the structural valuation model of Black and Scholes (1973) and Merton (1974), and were computed using the estimation procedure described in Vassalou and Xing (2004) using daily market and annual accounting data.

[74] Two caveats apply. First, the DD as employed in this paper does not take into account the stochastic interest rate risk stemming from the correlation between the risk-free rate and the value of a company's assets. As this is potentially another important source of risk banks face, risks might be underestimated in the analysis. See Liu, Papakirykos, and Yuan (2004) for an extension incorporating interest rate risk. Second, as the DD is based on market data, the DDs for LBGs can be subject to large fluctuations, which tend to be associated with the business cycle and 'expectation cycles' regarding future earnings prospects.

they have been shown to predict
supervisory ratings, bond spreads, and
rating agencies' downgrades.[75]

15.   ***The analysis provides a number
of conclusions regarding the impact of
evolving business strategies on LBGs'
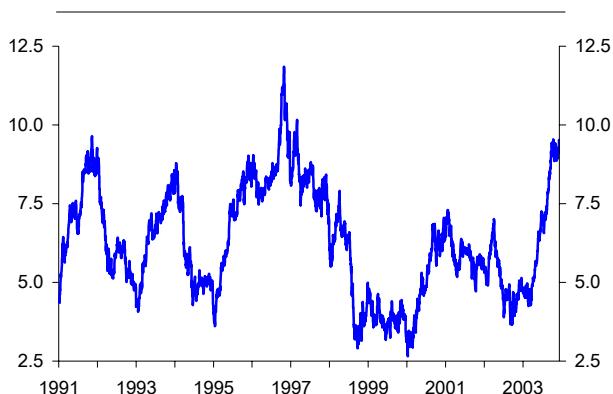financial soundness***:

- ***There appears to be no trend
  movement in the average DD for
  the six LBGs since 1990***
  (Figure 2). Although distance to
  default narrowed sharply in the
  late 1990s as a substantial deterioration in the risk-adjusted return outweighed rising
  capital ratios, the LBGs' average risk profile has again improved significantly in the
  last few years. Overall, this suggests that shifting business strategies and changing
  balance sheet structures have not led to a noticeable increase or decrease in average
  default probabilities for the LBGs.

Figure 2. Average Distance to Default of LBGs

Source: Fund staff calculations.

- ***With one notable exception, there
  has been no tendency for risk to
 concentrate in the largest banks***.
  Risk concentration can be
  measured as the difference
  between the weighted and
  unweighted average of DDs over
  all six institutions, with weights
  given by each LBG's share of total
  market valuation. A decline in this
  measure indicates a concentration
  of risk in the largest banks, and
  vice versa. For most of the period
  observed, this measure of
  concentration was unchanged (Figure 3). However, it dropped in 2002, owing to a
  substantial reduction in the market valuation of two of the largest LBGs.[76] The spike
  highlighted risks in two of Canada's important banks, even though average soundness
  measures for the sector remained satisfactory.

Figure 3. Risk Concentration in LBGs

difference between weighted and unweighted average of DDs
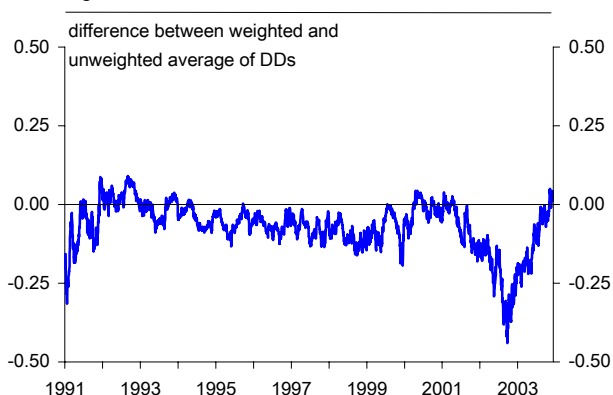
Source: Fund staff calculations.

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[75] See Krainer and Lopez (2001), Gropp, Vesala, and Vulpes (2002), and Chan-Lau, Jobert, and Kong (2004).

[76] If balance sheet valuations of assets are used to weight the DDs, the downward spike largely disappears. However, the use of market valuations seems preferable for diagnostic purposes as the objective is to capture the market's assessment of risk.

VII.   COMPETITION IN CANADA'S BANKING SYSTEM[79]

A.   Introduction

1.   ***With bank merger guidelines currently under review by the government, discussion on the merits of allowing mergers between large financial institutions continues***. Some analysts have argued that a lack of mergers may constrain banks' ability to compete internationally, given the comparatively small size of the Canadian market.[80] Other commentators have cautioned that mergers would increase the already high concentration in Canada's banking sector, adversely affecting competition and thus consumer interests.[81] Some observers are particularly concerned about the prospect of mergers among the six largest banks, which account for about 90 percent of all banking assets.

2.   ***This paper uses an Industrial Organization (IO) approach to measure the degree of competition among the largest Canadian banks compared with other countries***. In particular, it analyzes competition in banking systems with a larger number of banks than in Canada, such as the United States, which has a large and fragmented banking system; the United Kingdom, which has fewer banks; and continental Europe.

B.   Optimal Level of Bank Competition: A Review of the Literature

3.   ***The literature is inconclusive on the relative merits of a highly competitive banking system versus a structure that retains some degree of monopolistic power***.[82] This applies to the literature studying the consequences of competitive structures for allocative efficiency and productivity, as well as to work looking into the effects on banking system stability. Theoretical results largely depend on which particular model is chosen, and empirical approaches have also failed to support any firm conclusion.

4.   ***Standard IO methods applied to the banking industry suggest that perfect competition achieves allocation efficiency by channeling credit to its most productive use***. However, other theoretical approaches that take into account some specific aspects of the banking business—such the presence of information asymmetry and the effect of a bank's net worth on the quantity of credit supplied—suggest that a banking system with some market power may provide more and higher quality credit. This result rests on the argument that banks with some monopoly power are more prepared to engage in costly activities that

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[79] Prepared by Iryna Ivaschenko. This paper benefited from comments provided by the Bank of Canada and the Department of Finance.

[80] In an interview on September 3, 2004, Industry Minister Emerson said that Canadian banks risk becoming low level players on global lending markets if Ottawa does not allow them to merge. See also Bond (2003).

[81] For example, a majority of respondents to a recent survey conducted among members of the Canadian Federation of Independent Business and other small and medium-sized enterprises agreed that competition in the financial services sector should increase before additional bank mergers were approved.

[82] See Northcott (2004) for a comprehensive review of the literature.

mitigate information asymmetries, such as relationship lending and screening (Petersen and Rajan, 1995; Cetorelli and Peretto, 2000).[83] Empirical studies have also failed to find convincing evidence that market power is detrimental to credit allocation (Northcott, 2004, and references therein). Earlier studies found a negative relationship between the degree of competition and bank profits, but the results were not robust across time, products, or profit specification. More recent research has found that this relationship is weakened or eliminated if differences in banks' productive efficiency is taken into account (see Berger, 1995 and Punt and Rooij, 2001).

5.   ***Standard IO methods also suggest that perfect competition achieves productive efficiency since it maximizes the quantity of credit supplied at the lowest interest rate***. However, the results are not clear-cut once economies of scale—which usually exist in banking—are taken into account. Berger and Mester (1997) review studies that found some empirical evidence pointing at inefficiencies in banking, but it is not clear whether these arise from a lack of competition or unrealized scale economies.

6.   ***There is no consensus in the literature on which market structure may promote prudent behavior, which would benefit the stability of the financial system***. Some studies have suggested that market power may encourage prudent risk-taking and screening of borrowers, improving loan quality (Keeley, 1990; Salas and Saurina, 2003). However, other research found that strong regulations and disclosure requirements can mitigate risk-taking and promote screening regardless of the competitive environment (Cordella and Yeyati, 2002).

C. Methodology and Data

7.   ***This paper uses a standard IO approach to assess the competitiveness of large Canadian banking groups***. The Panzar-Rosse approach measures market power by the extent to which changes in factor prices are reflected in revenues. Under perfect competition, an increase in factor prices induces a proportional change in revenues since firms face perfectly elastic demand for their products. Conversely, under monopolistic competition, revenues change less than proportionally in response to changes in factor prices. In the case of a perfect monopoly, there may be no response or even a negative reponse of revenues to changes in input costs. To measure the degree of competition in a particular market, Panzar and Rosse (1987) proposed the so-called H-statistic, which is computed as the sum of elasticities of revenues to unit factor costs in a reduced form revenue equation.

8.   ***This approach has recently been applied to banking systems in a number of countries***. Although not initially intended to be applied to the financial system, Panzar and Rosse's original methodology has since been adapted to investigate the competitive structure

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[83] In addition, Petersen and Rajan (1995) using U.S. data also found that supply of credit to young firms is greater in the system with market power, which should encourage innovation and productivity growth.

of banks.[84] Applications in the literature include the cases of Germany and several European countries (De Bandt and Davis, 2000; IMF, 2003), the United States (Shaffer, 1982); and Canada (Nathan and Neave, 1989). Canada's broad financial system was found not to exhibit monopoly power at the time, but the consolidation that has taken place in recent years suggests a need to revisit this result.

9.   ***Following the approach of Nathan and Neave (1989), the following base model was estimated***:

$$\log INCNET = \text{constant} + \alpha \log PFUND + \beta \log PCAP + \lambda \log PLAB + \delta \log AAST \quad (1)$$

where *INCNET* is net income, *PFUND* the unit price of funds, *PLAB* the unit price of labor, *PCAP* the unit price of capital, and *ASST* represents total assets. Total assets are included to identify possible scale economies, given the wide range of asset sizes across countries. For this model, $H = \alpha + \beta + \lambda$. In perfect competition case $H=1$. A positive value of H, which is below unity, indicates monopolistic competition, with higher values of H corresponding to a more competitive industry. Negative values of H could indicate either that the banking system is perfectly monopolistic or that the market is not in equilibrium (e.g., because of structural change), in which case the H-statistic could not be applied.[85]

10.   ***The paper uses annual BankScope data for the largest banks in Canada, the United States, Germany, France, Italy, and the United Kingdom from 1999 to 2003***. The unit price of funds was calculated as interest expenses over total deposits, the unit price of labor as personnel expenses over total liabilities, and the unit price of capital as other expenses divided by total liabilities.[86] The sample contains 35 banks in Canada, 27 of the largest U.S. banks, 290 French banks, 266 German banks, 127 Italian banks, and 200 banks in the United Kingdom.

D. Results

11.   ***The empirical evidence supports the view that Canadian banks have grown more slowly than major foreign competitors*** (Table 1). Although the Canadian Big Six have

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[84] The extension of the Panzar-Rosse methodology to banking requires banks to be treated as single-product firms, consistent with the intermediation approach to banking in which banks are viewed as financial intermediatries (see Colwell and Davis, 1992, for details).

[85] Panzar and Rosse's (1987) model is based on the premise that the competitive structures under analysis are in a long-term equilibrium. Adjustments to shocks or structural change could affect the way changes in factor prices translate into revenue changes, rendering the H-statistic less useful.

[86] The cost per square foot of premises would be a better measure of the cost of physical capital, but this data is not currently available.

maintained profit growth, they have lagged their U.S. counterparts in both profitability and, particularly, balance sheet growth. The average size of the Big Six was comparable to banks in the United States and the United Kingdom in 1999. By 2003, however, large Canadian banks were on average 12 percent smaller than U.S. banks, and more than 60 percent smaller than banks in the United Kingdom.

12.   ***The Panzar-Rosse competitiveness measure provides a mixed assessment of the competitiveness of the Canadian banking system.*** The statistic was calculated for all banks in the sample, based on a fixed effect panel estimation.[87] The results indicate that the banking system in Canada is

Table 1. Size and Profitability Indicators of 25 Largest Banks			
Country	Total Assets 1/ (billion US$)	Return on Assets*	Return on Equity*
1999			
Canada	37.4	0.6	8.6
Big Six	137.0	0.8	15.9
France	113.0	0.5	2.5
Germany	75.7	0.2	5.0
Italy	55.9	0.9	10.8
Spain	29.8	1.0	11.0
United Kingdom	151.0	0.8	18.2
United States	143.0	1.6	18.1
2003			
Canada	52.4	0.8	9.4
Big Six	195.0	0.8	14.7
France	154.0	0.3	4.3
Germany	140.0	0.1	1.9
Italy	68.5	0.3	6.0
Spain	45.8	0.9	10.0
United Kingdom	325.0	0.6	12.3
United States	217.0	1.6	16.7

Source: BankScope.
1/ Unweighted average.

slightly more competitive than those in continental Europe, the United Kingdom, and the 27 largest national banks in the United States (Table 2). At the same time, the H-statistics for the Big Six banks is negative, which could suggest the presence of some monopolistic power. Canada is clearly not a case with large banks operating as a perfect monopoly, given that the H-statistic is not significantly different from zero, but alternative tests confirm that the Panzar-Rosse statistic is valid and not tainted by structural change.[88]

13.   ***The analysis indicates that Canada is not the only country where large banks seem to enjoy some pricing power***. The level of competition among large institutions in other countries varies considerably and—as in Canada—differs from the competitiveness measure of the broader system for some countries. For example, when comparing the 25 largest banks by asset value across countries, the results suggest that only U.K. and Spanish large banks operate in a fully competitive environment (Table 3). All other countries are similar to Canada in that large banks enjoy some degree of monopolistic power.

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[87] The fixed effect approach was suggested by a Hausman test.

[88] As discussed above, the negative value of the H-statistic could also indicate that the Canadian banking system goes through a period of structural change, in which case the Panzar-Rosse approach would not be valid. However, Shaffer (1982) argued that the return on assets or on equity (ROA/ROE) should not be correlated with input prices in the absence of structural change. Therefore, equation (1) was re-estimated with log ROA on the left hand side. The hypothesis H=0 could not be rejected, suggesting that the Panzar-Rosse statistic is valid in Canada's case.

Table 2. H-statistics, by Country and Region

Region	H-statistics 1/	Standard error	p-value
All countries	** 0.509	0.084	0.000
United States 2/	0.283	0.182	0.119
United Kingdom	** 0.581	0.087	0.000
Continental Europe	** 0.321	0.192	0.095
France	1.150	4.200	0.784
Germany	** 0.482	0.134	0.000
Italy	** 0.471	0.127	0.000
Spain	** 0.283	0.122	0.020
Canada, all banks	** 0.698	0.178	0.000
Canada, Big Six 3/	-0.389	0.391	0.319

Source: Fund staff calculations.
1/ Asterisks signify that coefficients are significant at 5 percent level
2/ Only the 27 largest, national banks are included.
3/ The Big Six banks include CIBC, Bank of Montreal, National Bank of Canada, Toronto Dominion, Royal Bank of Canada, and Scotiabank.

Table 3. H-statistics for 25 Largest Banks, by Country and Region

Region	H-statistics 1/	Standard error	p-value
All countries	** 0.467	0.120	0.000
United States	0.259	0.191	0.175
United Kingdom	** 0.705	0.134	0.000
Continental Europe	** 0.436	0.204	0.033
France	0.185	0.282	0.512
Germany	0.337	0.530	0.524
Italy	0.385	0.406	0.343
Spain	** 0.292	0.126	0.021
Canada	0.082	0.500	0.870
Canada, Big Six	-0.389	0.391	0.319

Source: Fund staff calculations.
1/ Asterisks signify that coefficients are significant at 5 percent level.

14.   ***The results also reveal that the number of large banks in a country is not as important for the level of competition as their combined market share***. For example, the Panzar-Rosse measure calculated for banks that hold 95 percent of a country's total consolidated bank assets—equal to the market share of the Canadian Big Six—again suggests that banking systems in the United Kingdom and Spain are particularly exposed to

competition (Table 4, upper panel).[89] However, competition increases across countries if the analysis is limited to banks that only account for 90 percent of total assets (Table 4, lower panel). At the same time, the number of banks accounting for a given level of bank assets varies greatly across countries and is not correlated with the Panzar-Rosse statistic (Table 5).

Table 4. H-statistics for Largest Banks, by Country and Region			
Region	H-statistics 1/	Standard error	p-value
Panel A. Banks accounting for 95 percent of total consolidated assets			
All countries	0.180	0.112	0.108
United States	0.261	0.185	0.158
United Kingdom	** 0.528	0.166	0.001
France	0.629	0.385	0.102
Germany	-0.947	2.036	0.642
Italy	0.025	0.170	0.884
Spain	** 0.421	0.157	0.007
Canada	-0.389	0.391	0.319
Panel B. Banks accounting for 90 percent of total non-consolidated assets			
All countries	** 0.416	0.123	0.001
United States	0.261	0.185	0.158
United Kingdom	** 0.509	0.145	0.000
France	** 0.584	0.286	0.041
Germany	-0.021	0.609	0.972
Italy	0.295	0.389	0.447
Spain	** 0.520	0.157	0.001
Canada	-0.249	0.531	0.639

Source: Fund staff calculations.
1/ Asterisks signify that coefficients are significant at 5 percent level. Specification includes total assets.

[89] For Canada, the market share of the Big Six only takes into account domestic banking assets, excluding foreign subsidiaries and credit unions.

Table 5. Size and Concentration of Banking Systems Across Regions, 2003

	Size (billion US$)	Number of banks holding 95 percent of assets (consolidated)	Number of banks holding 90 percent of assets (non-consolidated)
Canada	1,274	6	6
France	3,764	12	17
Germany	2,264	4	14
Italy	2,783	87	22
Spain	1,493	15	11
United Kingdom	7,226	12	17
United States 1/	7,809	25	25

Sources: Statistics Canada; United States Federal Reserve; Primark DataStream; and BankScope.
1/ National commercial banks only, accounting for 70 percent of consolidated assets.

E. Conclusions

This paper analyzes the level of competition in the Canadian banking system, with a particular focus on the six large banks, and compares it with banks in other industrial countries. Using an approach from the Industrial Organization literature, the paper does not reject the hypothesis that the Canadian Big Six may enjoy some degree of market power, although the broad banking system in Canada is found to be strongly competitive. The analysis of other countries reveals similar differences between large banks and the total banking system, with the United Kingdom and Spain the only countries where large banks appear to operate in a fully competitive environment. The paper also finds that the number of large banks in a country is not as important for the level of competition as their combined market share.

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