BANK OF CANADA

Financial System Review

December 2004

Members of the Editorial Committee

The significant contribution of individual authors of specific portions of the Developments and Trends section, as well as that of members of the working group mandated with the preparation and organization of the *Review*, is gratefully acknowledged.

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December 2004

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Developments and Trends

Notes

The material in this document is based on information available to *26 November* unless otherwise indicated.

The phrase “major banks” in Canada refers to the six largest Canadian commercial banks by asset size: the Bank of Montreal, CIBC, National Bank, RBC Financial Group, Scotiabank, and TD Bank Financial Group.

Promoting Financial System Efficiency and Stability

The Canadian financial system comprises financial markets, financial institutions, and the clearing and settlement systems. A well-functioning financial system (i) acquires and uses information to allocate resources to the most productive investment projects and (ii) manages and distributes risk to those most willing to bear it. The financial system adds to social welfare and economic growth because it improves the allocation of resources and reduces the volatility of consumption and investment. A well-functioning financial system is also able to better absorb adverse shocks, making the real economy less sensitive to them. As a consequence, economic growth is less volatile.

Frictions in the financial system can cause inefficiencies, which impair the efficient allocation of resources and make the economy more sensitive to adverse disturbances (i.e., more unstable) with significant welfare consequences (Haldane et al. 2004). Financial inefficiencies can arise for numerous reasons. (See Bauer 2004 for definitions of market efficiency.)

Informational asymmetries in both financial markets and institutions can develop because borrowers typically have more information than lenders about the potential value and risk associated with the investment projects for which they are seeking funds. These asymmetries are exacerbated by factors such as poor quality of financial information and poor corporate governance. Transactional inefficiencies, which increase the costs of financial transactions, can occur because of lack of competition in the provision of financial services, regulatory requirement, or poor legal infrastructure (e.g., weak enforcement of rules, regulations, and contracts governing the financial system). Cases like Enron expose extreme instances of how these types of inefficiencies can play out in the real world. There is empirical evidence that these frictions are important from a macroeconomic point of view, since countries with fewer financial frictions (e.g., better contract law, enforcement, and greater corporate transparency) tend to have stronger economic growth and lower output volatility (Dolar and Meh 2002; La Porta et al., 1997; and Cooley, Marimon, and Quadrini 2004).

Reducing financial inefficiencies can, in principle, lead to a better allocation of resources, as well as helping the economy and the financial system to better absorb shocks. Policy measures to increase the quality of financial information (e.g., better accounting and reporting standards, better corporate governance), as well as the enforceability of rules, regulations, and contracts governing the financial system can potentially promote both financial system efficiency and stability. Evaluating the ultimate net benefit of any given financial system policy, however, requires careful monitoring and analysis. In particular, policies should be reviewed so that they are, indeed, efficiently achieving the established public policy goal.

Overview

This section of the Financial System Review *examines the recent performance of the Canadian financial system and the factors, both domestic and international, that are influencing it. In each issue, one or more subjects of particular interest are discussed as highlighted topics.*

Key Points

- Continued strong global economic growth has reduced financial vulnerabilities in Canada and elsewhere.
- Higher oil prices have, however, raised questions about the strength of global economic prospects going forward.
- The global financial system appears well positioned to absorb increases in interest rates over time in several countries, including Canada.
- On balance, conditions in the Canadian financial system have improved since the publication of the June 2004 *Review*, and most risks have remained unchanged.
- Overall, the reported financial situation of Canadian non-financial corporations also improved through the first three quarters of 2004, despite the appreciation of the Canadian dollar. Profitability rose considerably in most industries, aided by stronger global demand.
- Initiatives aimed at enhancing investor confidence in Canadian capital markets have been introduced in Canada over the past few years. Some of these initiatives are reviewed in this issue.

The global economy expanded strongly in 2004. In this environment, the steps taken by businesses and financial institutions to restructure their balance sheets have bolstered the stability of the international financial system.

Global growth is expected to moderate somewhat in 2005, in part because of higher oil prices. Nonetheless, policy interest rates are expected to move up in a number of countries as central banks further remove some of the substantial degree of monetary stimulus that has been in place over the past several years.

High levels of indebtedness persist among certain borrowers worldwide (such as households, firms, and some governments in emerging markets). This high level of debt, in conjuction with the prospect of further increases in policy interest rates, poses some risks for the global financial system. However, borrowers appear, well positioned overall to deal with higher borrowing costs.

In particular, corporations and financial institutions in most industrial countries have improved their financial positions. As well, with higher interest rates being part of the cyclical process of economies returning to full production capacity, higher borrowing costs are not expected to have adverse effects on the global financial system.

In Canada, the health of non-financial corporations and households is important to the soundness of domestic financial institutions. Business and household credit account for roughly 30 per cent and 70 per cent, respectively, of the credit portfolio of financial institutions. This *Review* contains an assessment of the potential impact of changes in financial market conditions on both Canadian corporations and households.

On the corporate side, the analysis indicates that, since the late 1980s, improvements in the macroeconomic environment and in corporate

balance sheets, together with financial innovations and changes in the debt-maturity profile of firms, have decreased the corporate sector's exposure to cyclical movements in interest rates. As well, Canadian banks have reduced their exposures to large corporate loans.

The financial situation of the non-financial corporate sector continued to improve in the first three quarters of 2004. Despite the appreciation of the Canadian dollar since early 2003, profitability improved considerably over this period in most industries with a high exposure to international trade. The surge in commodity prices boosted profits in commodity-producing sectors, while weighing on the profitability of some commodity-consuming sectors. The further strengthening of the Canadian dollar in the past few months is expected to place additional financial pressure on some sectors and firms that are highly exposed to international trade. Overall, risks to the financial system arising from the non-financial corporate sector are currently considered to be small.

The indebtedness of Canadian households has continued to increase, reaching record levels. In this *Review*, the ability of households to service their debts in the event of either a cyclical increase in interest rates or a fall in house prices is assessed. The analysis suggests that a cyclical increase in interest rates should not significantly affect the credit quality of household debt, and that the possibility of a significant reversal in house prices in major Canadian housing markets is unlikely.

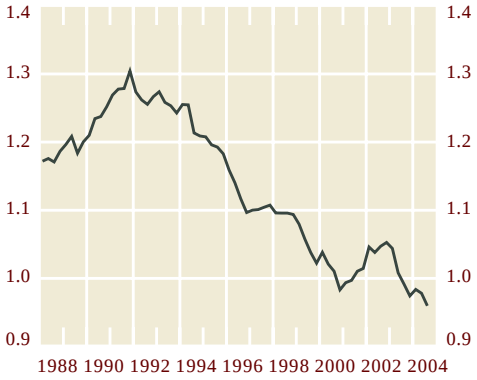
Financial institutions in Canada are in a sound financial position. Indeed, major Canadian banks reported continued strong profitability through the first three quarters of 2004, supported by a diversified business strategy. Canadian banks also continue to report high capital levels, well above minimum requirements. Other financial institutions also posted solid financial results. On balance, conditions in the Canadian financial system have thus continued to improve since the spring of 2004.

On the regulatory front, important initiatives that aim to enhance investor confidence in Canadian capital markets have been introduced in Canada over the past few years. These have been introduced by various governments, regulators, and financial market participants. A descriptive overview of some of these initiatives is provided in this *Review*.

Although the state of domestic and global financial systems has improved since the June *Review*, the global financial system continues to face some risks. Even if developments in the yield differentials of emerging-market debt reflect a lessening of macroprudential fears, and these differentials thus remain low, a risk persists that they will increase dramatically. This could occur if expectations about policy rates were revised upwards sharply. But the likelihood of this remains small.

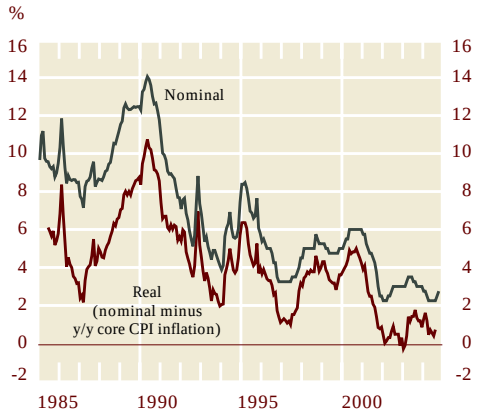
The global economy also continues to face risks. Adjustment to the large U.S. trade and fiscal deficits is one risk. Recent renewed broad-based U.S.-dollar weakness appears to reflect concerns about these deficits. There are also uncertainties related to the geopolitical situation and the high level and volatility of crude oil prices.

Chart 1 Debt-to-Equity Ratio of Canadian Non-Financial Corporations



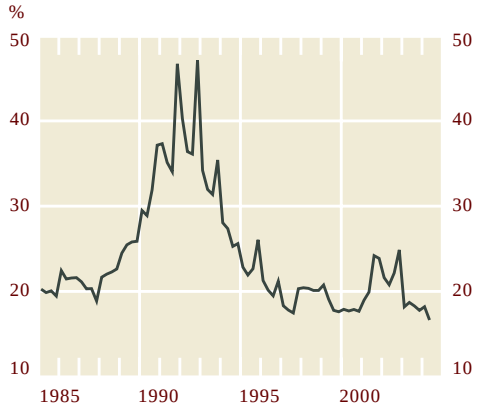
Source: Statistics Canada

Chart 2 Bank Rate



Source: Bank of Canada

Chart 3 Non-Financial Business Sector Debt Capacity: Debt-Service Costs to Cash Flow



Source: Statistics Canada

Highlighted Issues

Three issues are discussed in this section: the potential impact of higher interest rates on Canadian corporate balance sheets, the financial position of the Canadian household sector, and initiatives to enhance investor confidence in Canadian capital markets.

Potential impact of higher interest rates on Canadian corporate balance sheets

The health of Canadian non-financial firms is important to the banking sector. Indeed, despite the decreasing exposure of Canadian banks to corporations, business credit still accounts for about 30 per cent of the credit portfolio of financial institutions. In the past, Canadian financial institutions have experienced significant losses on their corporate loans during economic downturns or periods of sharply rising interest rates. It is therefore worthwhile to assess how the removal of monetary policy stimulus in the current cycle might affect the corporate sector.

First, the response of the balance sheets of non-financial businesses to the period of monetary policy tightening at the end of the 1980s is examined. The subsequent trends and developments that have affected corporate balance sheets are then reviewed, and the potential impact of rising interest rates on the Canadian non-financial business sector is assessed.

It is important to note that this analysis draws upon aggregate indicators of financial conditions in non-financial businesses. Although this provides useful information, conditions across different industry sectors and individual businesses could also have important implications that are not captured in this discussion.[1]

Monetary policy tightening in the late 1980s

Both the macroeconomic environment and the health of corporate balance sheets were very different in the late 1980s than they are currently. In particular, the corporate sector was more highly leveraged (Chart 1). As well, Canadian banks have reduced their exposures to large corporate loans over the past few years. The late 1980s were also characterized by entrenched expectations of moderate inflation. The need to control inflation led to a period of rapid monetary policy

1. See the "Industry" section on p. 22 of this *Review*.

tightening. The Bank Rate increased from 7.2 per cent in 1987 to 13.8 per cent in 1990 (Chart 2).

With corporations borrowing relatively large amounts of short-term debt, rising short-term interest rates led to a large increase in the debt-service costs of the business sector. In addition, the economic slowdown itself had an important adverse impact on profitability. As a result, the ratio of debt service to cash flow increased substantially for businesses, from 19 per cent in 1987 to 47 per cent in 1992 (Chart 3).[2]

Deteriorating corporate balance sheets also had a negative impact on Canadian banks. The aggregate loan quality of Canadian banks deteriorated as the ratio of gross impaired loans to total loans rose sharply from 3.4 per cent in 1989 to 5.8 per cent in 1992 (Chart 4). Although the data for business-loan losses is available only from 1994 onwards, it appears that corporate loan losses were an important driver of the total aggregate loan quality in the late 1980s.

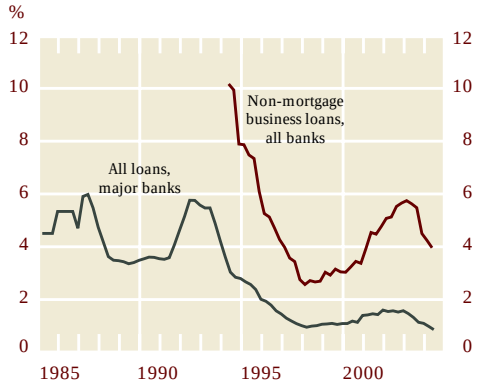
What might happen with the expected removal of monetary stimulus in the current cycle?

With inflation expectations well anchored to the 2 per cent inflation target, the removal of monetary stimulus over the current cycle is anticipated to entail relatively modest adjustments in interest rates. As well, non-financial corporate profits have been high and are expected to remain robust, acting as a buffer when interest rates and debt-servicing costs rise. The increase in the debt-service ratio of businesses should thus be significantly lower than was the case in the late 1980s. Moreover, the balance sheets of Canadian banks are much healthier. In particular, the ratio of gross impaired loans to total loans is currently very low (see Chart 4).

The rise in the debt-service ratio is also likely to be restrained by recent financial innovations and by changes in the composition of corporate balance sheets over the past decade. A number of trends indicate improvement in Canadian corporate balance sheets. First, equity financing has become a major financing source, accounting for 31 per cent of total outstanding business credit in 2004, up from 26 per cent in 1987 (Chart 5). As a result, the debt-to-equity ratio

Chart 4 Gross Impaired Loans to Total Loans

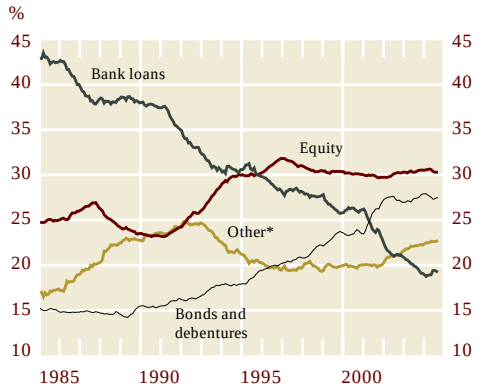
By category



Source: Banks' quarterly reports and Office of the Superintendent of Financial Institutions (OSFI)

Chart 5 Non-Financial Corporate Sector Financing

Percentage of total credit

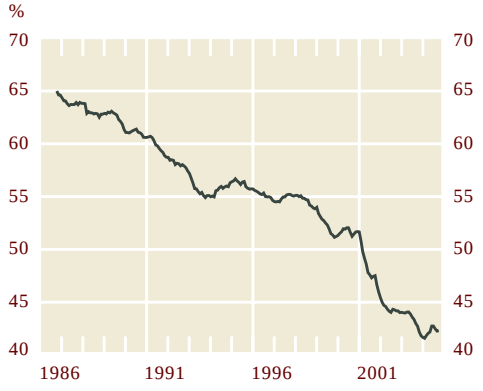


* Includes non-residential mortgage loans, lease receivables, commercial paper, and other loans

Source: Statistics Canada

Chart 6 Non-Financial Corporate Sector: Short-Term Credit

Share of total credit minus equity and trust units



Source: Statistics Canada

2. Business debt service to cash flow is defined as interest payments divided by (after-tax profit plus non-cash items).

has fallen from 1.17 in the late 1980s to the current historic low of 0.96 (recall Chart 1). Lower leverage implies healthier corporate balance sheets and lower bankruptcy risk, everything else being equal. Indeed, for a given level of asset risk, reduced leverage implies that corporate balance sheets will be less affected by higher loan rates when interest rates rise.

At the same time, there have been major developments in the debt-maturity profile of corporate debt. First, the share of short-term debt in total credit has fallen steadily from 65 per cent in 1987 to 42 per cent in 2004 (Chart 6). The lower reliance of firms on short-term debt suggests a smaller increase in refinancing costs when debt is rolled over, should interest rates rise, or more generally, lower liquidity risks. Second, bank loans, which were the major source of financing in the late 1980s, have been replaced by the increasing issuance of bonds and debentures. For example, bond financing increased from 16 per cent of total credit in 1990 to 28 per cent in 2004 (Chart 5).

Greater reliance on market financing and the increased use of derivatives, such as interest rate swaps, have offered corporations more flexibility to adjust their debt profiles and to manage debt-servicing costs based on their exposure and interest rate expectations. Indeed, interest rate swaps allow corporations to effectively unbundle funding and interest rate decisions.[3] This is a significant improvement from the situation in the late 1980s, when bank loans, the main source of financing, offered fixed terms to maturity and derivatives markets were less developed. But the increased use of interest rate swaps and other derivatives also implies that the share of short-term credit in total corporate credit may no longer be a useful stand-alone guide for assessing corporate exposure to various maturities of interest rates. Information about the direction of the aggregate transfer of interest rate exposures from corporations from the use of interest rate swaps would be required. This information is not, however, readily available.

A more complete assessment of the interest rate exposures of non-financial corporations requires an analysis of their defined-benefit pension plans. Although pension plans are technically off-balance-sheet items, the corporate sponsors of defined-benefit plans are legally required to meet pension liabilities. The average corporate defined-benefit plan in Canada has been in deficit since early 2002. These deficits arose primarily because of weak equity markets, which reduced asset values, and falling interest rates, which increased the present value of pension liabilities (Armstrong 2004).

On balance, rising interest rates reduce pension deficits. Higher bond yields tend to reduce the value of bond holdings (which typically comprise about 40 per cent of the assets of large pension plans), but also lower the value of 100 per cent of pension liabilities (which are calculated as the present value of future benefits). Therefore, the net effect of rising interest rates on corporate pension funding is significantly positive. For example, at the end of the third quarter of 2004, Mercer's Pension Health Index shows an average funding ratio (assets divided by liabilities) of 89 per cent, up from a cyclical low of 83 per cent in 2003. Mercer estimates that an increase in bond yields of 100 basis points at all terms to maturity could improve the average funding ratio to about 96 per cent.[4]

Overall, the analysis indicates that the improvements in the macroeconomic environment and in corporate balance sheets, including increased reliance on equity financing, changes in the debt-maturity pattern, as well as financial innovations, have decreased the exposure of the corporate sector to interest rate risk. Therefore, the removal of monetary stimulus in the current cycle should have only a relatively small impact on corporate balance sheets, especially when compared with developments in the late 1980s.

Financial position of the Canadian household sector: Autumn 2004

The December 2003 *Review* featured an assessment of the potential impact of changes in the financial environment on the ability of households to service their debts. That analysis found that financial system risks relating to the credit quality of the household sector remained manageable.

Since then, household credit has strengthened further (Chart 7). This trend reflects the increases in both mortgages and consumer credit, which

3. These instruments do not necessarily eliminate interest rate risk but enable the corporation to tailor its exposure to interest rate risk.

4. This calculation is only meant to be suggestive, since it assumes that all other variables are held constant.

includes vehicle loans, credit card loans, renovation loans, and lines of credit. Consistent with these developments, household spending has been a significant contributor to domestic economic growth since 2000. This growth also reflects the increasingly widespread access of households to various sources of financing, but raises the prospect of their increased sensitivity to interest rates.

The financial health of Canadian households is increasingly important to the banking sector in light of the greater emphasis that Canadian banks have placed on retail lending since 2002. Household credit now represents over one-half of the total loan exposure of financial institutions (Chart 8). About 70 per cent of household credit is mortgage debt, of which roughly half is insured. About 70 per cent of this mortgage debt has a term to maturity greater than two years. Nevertheless, if the ability of households to service their debts is significantly compromised by higher interest rates, a drop in house prices, or a reduction in household disposable income, the resultant reduction in credit quality could adversely affect lending institutions. For instance, higher interest rates could significantly increase the debt-service costs of households, and lower house prices could result in the value of the financed property dropping below the value of the mortgage. Both outcomes could reduce the ability and willingness of households to service their debts.

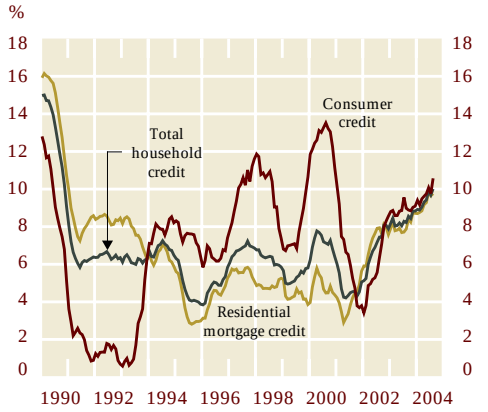
In the following assessment of the potential impact that changes to the financial environment may have on the ability of households to service their debts, it is important to note that this analysis draws upon broad-based indicators of household financial conditions. While this provides useful information, particular conditions across different levels of household income could have important implications not captured here.

Servicing household debt

Total household indebtedness, as measured by the ratio of debt to disposable income, has continued to rise, reaching a record high of 119 per cent in the second quarter of 2004 (Chart 9). However, this higher indebtedness should be seen against the background of rising household net wealth arising from higher prices for houses and other assets. Indeed, the new Statistics Canada balance sheet estimate of household indebtedness relative to net assets on a market-value basis has actually eased over the past year.

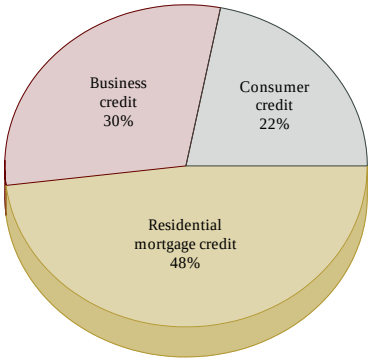
Chart 7 Household Credit

Year-over-year rate of growth



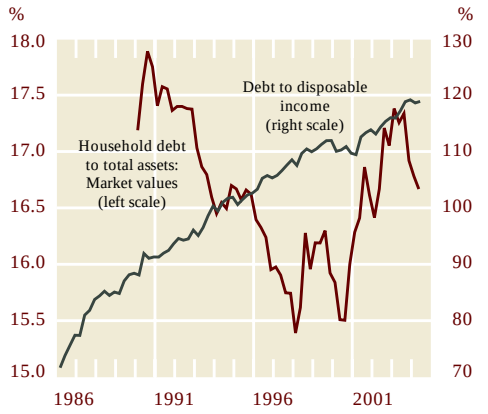
Source: Bank of Canada

Chart 8 Distribution of Lending by Canadian Financial Institutions



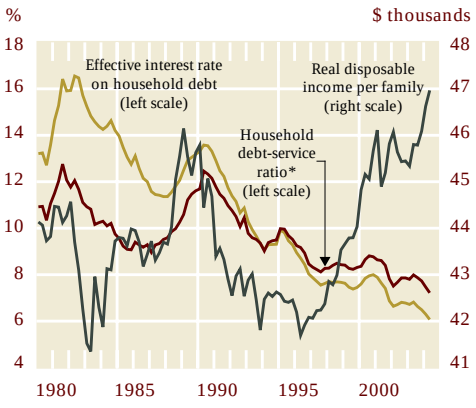
Source: Bank of Canada. Based on year-to-date average balances as of September 2004

Chart 9 Canadian Household Debt Ratios



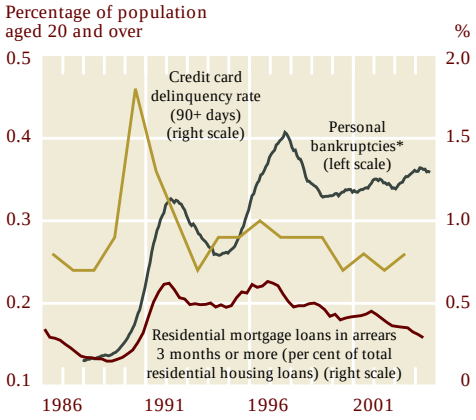
Source: Statistics Canada

Chart 10 Household Sector Debt



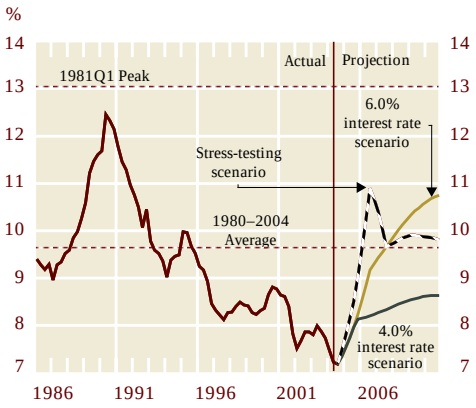
* Does not include principal repayments (See Box 1.)
Source: Statistics Canada and Bank of Canada calculations

Chart 11 Canadian Financial Indicators



* 12-month moving sum
Source: Statistics Canada, Canadian Bankers Association, and Bank of Canada calculations

Chart 12 Projections of the Debt-Service Ratio Based on Different Paths for the Overnight Rate



Source: Statistics Canada and Bank of Canada calculations

In addition, the cost of servicing these higher levels of indebtedness has remained near historic lows, owing to low consumer and mortgage interest rates (Chart 10). Indicators of the degree of financial stress affecting households also remain positive. For example, residential mortgage loans in arrears and the rate of credit card delinquency have both remained low (Chart 11).

Potential challenges: Rising interest rates

By making a number of assumptions, it is possible to gauge the impact of higher interest rates on the debt-service burden of Canadian households.[5] (See Box 1 for a description of the methodology used to conduct these simulations.) Simulations assess the impact on the aggregate household debt-service ratio of nominal short-term interest rates returning to more normal levels of 4 to 6 per cent in 2005. (Such rates would be roughly consistent over time with an environment of two per cent inflation.)

The results indicate that in 2005–07, the debt-service ratio would increase to a range of 9 to 11 per cent, from the current level of about 7.3 per cent. At these levels, the debt-service ratio would remain near its 1980–2004 average, but would stay well below earlier peaks (Chart 12).[6] Although households may be more sensitive to a given change in interest rates, a steady flow of income remains the key factor in the ability of households to service their debt. In this respect, current prospects for employment growth, and economic conditions more generally, remain supportive.

The same method can be used to assess household debt-servicing costs under an extreme interest rate scenario. In the extreme scenario, interest rates are assumed to increase in 2006 as they did in 1994–95 (short-term rates rapidly rise by 400 basis points above the midpoint of their historical range, to 9 per cent), before returning to 5 per cent in 2007.[7] Under such a scenario, the debt-service ratio increases by 2007

5. Similar simulations were initially reported in the December 2003 issue of the *Review*. Simulations reported here are based on a richer and more complex methodology.
6. Other components of household financial portfolios are also affected by changing interest rates, but their impact on household wealth would be relatively small. See the December 2003 *Review*.
7. Thus, short-term rates are assumed to increase by 650 basis points from their level on 26 November 2004.

Box 1

Simulating the Impact of Rising Interest Rates on the Debt-Service Ratio

One measure of the cost of household indebtedness is the debt-service ratio, calculated as the share of disposable income required to make interest payments on existing debt. To estimate the future path of all the components of this ratio a number of assumptions must be made.

The data

Estimating past levels of the debt-service ratio requires data on its various components. Statistics Canada data on personal disposable income and household debt are used. Posted rates on consumer loans are used to calculate consumer debt-service payments. The use of posted rates would overestimate interest payments on mortgage loans, given the prevalence of mortgage rate discounting in Canada. Therefore, estimated discounted rates are applied to a share of mortgage loans, increasing from 25 per cent in 1990 to 80 per cent in 2004.

Information on the term structure of household debt in the 1980s and 1990s is used to calculate a weighted average of interest rates (Montplaisir 1996–97). The key development in this area is the increasing popularity of variable-rate mortgages, which currently account for about 20 per cent of total mortgages.

Estimating the future path of the debt-service ratio

The debt-service ratio is calculated as the product of the debt-to-income ratio and prevailing interest rates. In all scenarios, the debt-to-income ratio is assumed constant at its most recent level of 119 per cent.[1]

Interest payments are the product of debt levels and household borrowing rates, weighted by the share of each type of debt in the total debt. Moving averages of interest rates are applied to fixed-rate debt to capture the lagged effects implied by long-term debt contracts. For variable-rate debt, the relevant interest rate is that prevailing in a given period.

A flattening of the yield curve is assumed to lead to a reduction in the share of variable-rate mortgages, as borrowers shift to fixed-rate mortgages. Accordingly, the share of variable-rate mortgages is adjusted downwards as interest rates rise.[2]

Scenario 1: Rates return to more normal levels

We consider the normal range for short-term interest rates in Canada to be 4 to 6 per cent. This is roughly consistent with historical experience since 1970 and with a 2 per cent inflation rate.

Estimating lending rates that are consistent with normal short-term rates requires two steps: First, risk-free rates for different maturities are derived by assuming that the historical yield spread is a measure of the normal term premium and using linear interpolation; second, historical intermediation spreads are added to the risk-free rates to obtain lending rates for different maturities. The assumed rise in interest rates to more normal levels and the associated flattening in the yield curve take place at a measured pace.

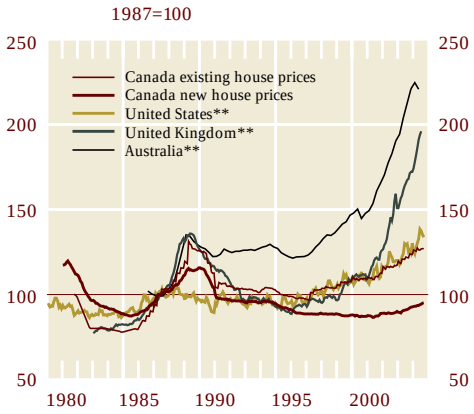
Scenario 2: Stress testing

In this scenario, interest rates increase in two phases: First, interest rates rise to a normal level of 5 per cent. The assumptions underlying the calculations in this phase are consistent with Scenario 1. Second, further increases occur for all maturities that are similar in magnitude to those of the 1994–95 period.[3]

The second phase is associated with a further flattening of the yield curve, since long-term rates increase more modestly than shorter-term rates because agents perceive the increases as transitory.[4] The share of variable-rate mortgages is not reduced in the second phase owing to the transitory nature of the rate increases.

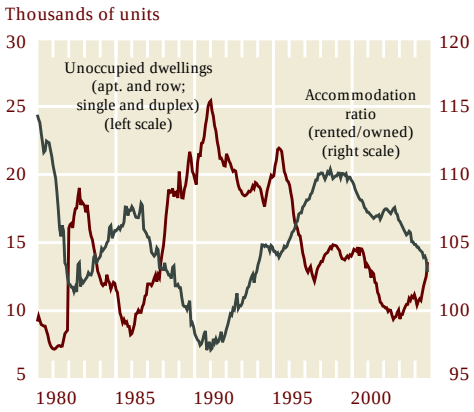
1. Higher interest rates could slow debt growth and lead to a decline in the debt-to-income ratio. Alternatively, if the debt-to-income ratio maintains its upward trend, then the calculations would underestimate the impact of rising rates on debt-service costs.
2. Variable-rate mortgages tend to cap households' debt-service payments, with changes in interest rates affecting mainly the rate at which the principal is repaid. Our calculations do not allow for this feature and may therefore overestimate the impact of higher interest rates on household cash flow.
3. This is a commonly used stress-testing scenario in risk management. Such increases in interest rates could result from several different circumstances. For instance, rising rates could be related to a general increase in risk premiums, perhaps due to a decrease in investor tolerance for risk. We assume here that such circumstances would not affect the debt-to-income ratio, which is assumed to remain constant.
4. The overnight rate rises to a peak of 9 per cent in the stress-testing scenario, before adjusting back to a more normal level of 5 per cent.

Chart 13 International Levels for House Prices: Real*



* Deflated using national consumer price indexes, except for the U.K. where retail prices were used
** Weighted prices for new and existing houses
Source: Bank of Canada and Royal LePage (Canada), Statistics Canada (Canada and U.S.), Australian Bureau of Statistics (Aus.), Halifax plc (U.K.)

Chart 14 Housing Market Indicators



Source: Bank of Canada, Royal LePage, and Statistics Canada

but remains below its historical peak of 13 per cent, before falling back (Chart 12). Such a rapid increase in the aggregate debt-service ratio could adversely affect the quality of household credit.

A more likely scenario of cyclically rising interest rates should provide households with time to adjust their spending behaviour. Such an outcome should not significantly affect the ability of households to service their debts, and therefore should not significantly affect financial institutions.

Potential challenges: House prices

In recent years, the prices of new and existing houses in Canada have risen more gradually than was the case in the late 1980s, and the increase has been more subdued than in other industrialized countries (Chart 13). Nevertheless, it is useful to assess the nature of recent developments in the Canadian housing market and their potential impact on the Canadian financial system.

First, rising disposable incomes and historically low interest rates in the past several years support rising housing prices (recall Chart 10). Second, the accommodation ratio, which measures the relative cost of renting a dwelling in comparison to owning, continually increased during the 1990s (Chart 14); i.e., the cost of renting increased compared with the cost of owning.[8] This contributed to a rise in the number of potential homebuyers and supported housing prices. Although recent house-price increases have contributed to a very gradual decrease in the accommodation ratio since 2000, it remains near its historical average. This suggests that house prices are not out of line with their fundamental value. Indeed, various other measures of housing affordability in Canada indicate that housing costs remain near or below their average over the past 20 years.[9] Third, recent home purchases have been made largely for occupancy purposes, rather than for potentially speculative investment purposes. Indeed, the increase in housing prices over the past five years has

8. The accommodation ratio is equal to the rented-accommodation component of the CPI divided by the owned-accommodation component of the CPI.
9. These include the ratio of household income taken up by mortgage costs (principal and interest components) and the RBC Housing Affordability Index.

been accompanied by a general downward trend in the number of unoccupied (vacant) dwellings across Canada and in major urban areas (Chart 14).[10] Finally, recent strong increases in the supply of housing in response to demand and price pressures suggest that market forces are working effectively. Indeed, listings of existing houses have risen strongly over the past year, and housing starts have increased significantly since 2002 (Chart 15).

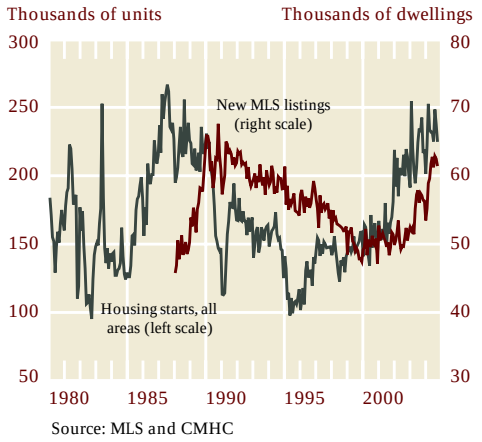
Taken together, these developments indicate that risks to the financial system related to developments in the Canadian housing market are currently limited. Because current housing prices seem to be supported by strong fundamentals—and should continue to be supported by positive economic conditions—with very few signs of speculative behaviour, the possibility of a significant reversal in house prices in major Canadian markets is unlikely.

Although the current assessment of the potential impact of changes to the financial environment on the ability of households to service their debt levels does not suggest near-term dangers, other longer-term structural developments affecting households may warrant monitoring. Indeed, it appears that certain risks may be migrating from various segments of the financial system to the household sector and may thus affect the future savings behaviour of households.[11]

Exposure of lending institutions to households

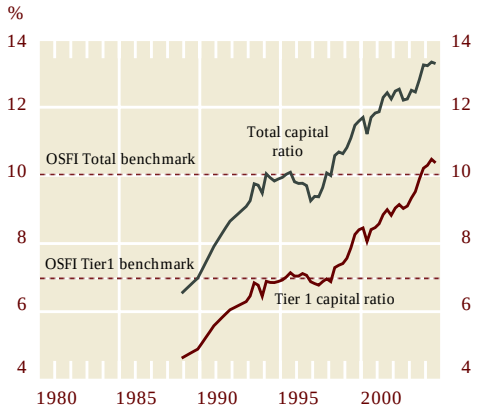
As indicated in Chart 8, household credit represents over one-half of the total loan exposure of financial institutions. Much of this exposure is, however, backed by assets. Indeed, mortgage debt, which accounts for almost 70 per cent of total household debt, is supported by the value of the property, and high-ratio mortgages are

Chart 15 Housing Starts and New MLS Listings



Source: MLS and CMHC

Chart 16 Bank Capital Ratios



Source: OSFI

10. This analysis does not exclude the possibility that modest imbalances exist in certain regional or specific segments of the housing market (e.g., condominiums).
11. For instance, there appears to be a shift away from defined-benefit pension plans towards defined-contribution plans. Should this trend become more generalized, the retirement income of an increasing number of future pensioners will depend on the performance of pension plan assets rather than being a guaranteed level. Such structural developments, although diversifying overall financial system risks, suggest that risks borne by households are rising.

covered by mortgage insurance.[12] Even the remaining portion of household credit, that of consumer credit, is partially secured by assets such as real estate. Over the past few years, it is estimated that approximately 30 per cent of consumer credit is secured.[13]

In addition, the Canadian banking system currently retains capital well in excess of that required (Chart 16). This suggests that the Canadian banking system could withstand a deterioration in the quality of household credit.

Overall, financial system risks relating to household credit quality remain low. A cyclical increase in interest rates should not significantly affect the credit quality of household debt, and thus should not significantly affect financial institutions. As well, the possibility of a significant reversal in house prices in major Canadian markets is unlikely.

Selected initiatives to enhance investor confidence in Canadian capital markets

Broader participation in financial markets is likely to result when participants can be confident that markets are free from manipulation and fraud. This provides a clear incentive for stakeholders to foster markets that operate in a way that merits confidence and trust. Towards this end, Canadian federal and provincial governments, securities regulators, and market participants have implemented various initiatives to support financial market integrity.

There is a link between financial system efficiency and the stability and resiliency of both the financial and real sectors of the economy.[14] As such, initiatives that help improve the efficiency of the financial system have the potential to improve financial stability. One approach towards reducing financial inefficiencies is to increase the integrity of financial markets.

There is no standard definition of market integrity. The lack of integrity is easier to identify; for example, instances of price manipulation by a single firm (or investor), misleading accounting information, poor governance practices, or illegal insider trading. A lack of market integrity has clear negative implications for the efficiency of the market. If investors do not have confidence in the quality of financial information and in the regulators' ability to enforce market principles of fairness, they may require higher risk premiums or reduce their willingness to participate in financial markets. Both such occurrences could increase the cost of capital.

Over the last several years, financial markets in several countries have experienced a number of high-profile corporate scandals (e.g., Enron, WorldCom, Parmalat, and Bre-X) that have had a negative impact on investor confidence in the fairness and integrity of financial markets. These occurrences, while relatively isolated events, highlight the need to continue to work towards a high level of market integrity. Several initiatives have been designed to strengthen investor confidence in Canadian capital markets.[15]

Market behaviour

Some of these initiatives relate to developing principles and best practices to guide the conduct or behaviour of market participants, with the aim of improving liquidity and efficiency in the markets.

In 1998, the Bank of Canada and the federal Department of Finance worked actively with market participants in developing a series of initiatives to promote and maintain the integrity of Canadian fixed-income markets in general, and the well-functioning of the Government of Canada securities market, in particular. These efforts were directed to the primary and secondary markets so that the possibility and perception of market manipulation were minimized.

In the primary market, the Bank and the Department of Finance revised auction rules for the issuance of Government of Canada securities and

12. The securitization of household debt has also been another significant trend in consumer debt. Securitization allows banks to restructure their exposure to these loans, effectively selling it in the form of bonds to a range of investors.
13. The importance of lines of credit (of which more than 40 per cent are secured, mainly by residential property) has grown, and these now represent 48 per cent of consumer credit. Personal loans (of which about 45 per cent are secured) represent 22 per cent of consumer credit. See CIBC World Markets (2004) and Clayton Research (2003).
14. See Bauer (2004) on page 37 of this *Review* for definitions of market efficiency.
15. See Armstrong (2003) for an earlier discussion of the initiatives that aim to enhance domestic governance practices.

enhanced the Bank's role in monitoring auctions to increase confidence in the auction process for government securities and to encourage participation from customers and dealers.

The Bank and the Department of Finance also worked actively with the Investment Dealers Association (IDA) to develop Policy No. 5, a code of conduct for trading in domestic debt markets. While Policy No. 5 applies directly to IDA members, its principles are expected to be a guide to all participants in the wholesale debt market.

Initiatives to enhance standards in the Canadian foreign exchange market and the global market for the Canadian dollar have also been undertaken. In 2001, the Canadian Foreign Exchange Committee (CFEC), together with the Canadian Committee for Professionalism (CCFP) and the Financial Markets Association of Canada (FMAC), adopted the ACI[16] Model Code as the recommended standard for best market practices in the Canadian foreign exchange marketplace. The Model Code combines the recommendations of six pre-existing codes of conduct (those of New York, London, France, Singapore, Tokyo, and the original ACI Code). As such, it is a comprehensive set of global guidelines for best market practices and personal conduct for over-the-counter foreign exchange markets.

Enforcement

The lack of enforcement of security laws can be a challenge to market integrity. Credible enforcement by regulators is vital to establishing the right incentives to deter market participants from committing any fraud or malpractice. Initiatives to bolster enforcement in Canada have been implemented by governments, securities regulators, and self-regulatory organizations (SROs), especially since 2002. (See Box 2 for a description of enforcement initiatives.)

Corporate governance and disclosure

There have also been initiatives to encourage firms to develop practices that are in the best interest of all investors. Accounting and disclosure rules have also changed to provide investors with better quality and availability of financial information. Timely, accurate, and truthful financial information is critical for investors, since it allows them to properly evaluate the risk and value of a company in their investment decisions.

In June 2002, major Canadian institutional investors created the Canadian Coalition for Good Governance (CCGG), a not-for-profit organization whose mission is to promote "best corporate governance practices and to align the interests of board and management with those of the shareholders." In 2003, the CCGG introduced governance guidelines that propose minimum standards and best practices for Canada's largest publicly traded companies. Although the CCGG does not have the authority to impose binding rules on companies, it has reviewed the governance practices of over 100 companies and has recommended improvements. More recently, the Toronto Stock Exchange followed CCGG recommendations and introduced new stock symbols that clearly identify shares with non-conventional voting rights.

In July 2002, federal and provincial regulators, as well as Canada's chartered accountants, announced the creation of the Canadian Public Accountability Board (CPAB). CPAB is an independent public oversight system for accountants and accounting firms that audit "reporting issuers."[17] Its main mission is to strengthen the independence of auditors and to support investor confidence by promoting consistent, high-quality, independent audits of Canadian public companies. To carry out its mission, CPAB has developed a comprehensive inspection program to review the quality-control systems of participating audit firms. With the new rules in place, accounting firms that audit reporting issuers must be registered as participating members in CPAB's oversight program.

In March 2004, the Canadian Securities Administrators (CSA) adopted a number of regulatory instruments governing auditor oversight and the disclosure requirements applicable to public companies.[18] These new rules follow the enactment in the United States of the Sarbanes-Oxley

16. ACI-The Financial Markets Association.

17. CPAB defines reporting issuers as companies that have raised funds from the Canadian investing public and who, for that reason, must file financial statements with one or more provincial securities commissions.

18. The CSA is a forum where the 13 securities regulators of Canada's provinces and territories can coordinate and harmonize the regulation of Canadian capital markets.

Box 2

Initiatives Regarding Enforcement of Securities Laws in Canada

High-profile corporate scandals have refocused attention on the enforcement of Canadian securities laws. A wide range of coordinated initiatives to bolster enforcement have been undertaken by the Government of Canada, provincial securities commissions, and self-regulatory organizations (SROs). These initiatives, described below, include the dedication of more resources to investigation and prosecution of white-collar crime, the passage of new laws, adoption of new regulatory instruments, changes to the structure and processes of self-regulatory organizations, and the development of new electronic reporting systems.

In 2002, the federal government committed to boosting investor confidence in Canadian financial markets. As a result, Integrated Market Enforcement Teams (IMETs) were established in 2003. IMETs are multidisciplinary teams jointly managed by the Royal Canadian Mounted Police and other partner agencies and departments (e.g., the Department of Justice). They work closely with securities regulators and other federal and provincial authorities and are aimed at improving the investigation and prosecution of the most serious market-related crimes. IMETS are currently operating in Toronto, Vancouver, Montréal, and Calgary.

Another major federal government initiative was the passing of Bill C-13 in March 2004. Bill C-13 makes insider trading an offence under the Criminal Code and increases the maximum sentences for existing fraud offences. It also endows investigators with new search powers to obtain data and information from persons under investigation and provides whistleblower protection to employees who report unlawful conduct. These requirements came into force in September 2004.

At the provincial level, Ontario brought amendments to the Securities and Commodity Futures Acts into force in April 2003. These amendments increase penalties and give the Ontario Securities Commission (OSC) more enforcement power for certain Securities Act offences. In November 2003, the OSC also launched the Mutual Fund Probe to investigate potential late-trading and market-timing abuses by retail mutual funds in Ontario.

Self-regulatory organizations bear certain responsibilities for the participants in the Canadian securities industry. Major initiatives at the Investment Dealers Association's Enforcement Division include the implementation of a risk-based operational approach, development of the Case Tracking System, and the creation of a complete set of policies and procedures for enforcement personnel. As of 15 October 2002, all IDA members are required to use a web-based system (ComSet) to file reports every time the firm receives a public complaint, is subject to a lawsuit relating to securities transactions, or becomes aware of a criminal or regulatory investigation relating to the firm.

The Toronto Stock Exchange's demutualization ultimately led to the creation of Market Regulation Services Inc. (RS Inc.)—an independent supervisor of trading in Canada's stock markets. RS Inc. has implemented a common set of trading rules across the country, instituted new early-warning systems to mark potential trading violations, launched a new national Cease Trade Order database, and participated in the creation of a national task force to examine illegal insider trading.

In November 2003, the Insider Trading Task Force, created earlier by regulatory authorities, released its report, which recommended practices for preventing, detecting, and deterring illegal insider trading in Canada. One of the issues identified was trading through nominee and offshore accounts that may prevent regulators from obtaining sufficient evidence in suspected illegal insider trading cases. In May 2004, the Canadian Securities Administrators approved amendments to the IDA's policy on the ownership of corporate accounts, which require member firms to identify and verify beneficial owners for every new and existing corporate account.

Technological advances have also facilitated compliance with the requirements of securities laws. In May 2003, the System for Electronic Disclosure by Insiders (SEDI) became fully functional. SEDI is a web-based service that allows insiders to file their trades in electronic format and provides information to the market about the trading activities of directors, senior officers, or significant shareholders of reporting issuers. The system also serves to deter insider trading based on confidential information, since insiders know they must publicly disclose all of their trades.

Given the relatively recent implementation of all these initiatives, it will be important to periodically assess their contribution to the efficiency of the Canadian financial system.

Act of 2002. The Canadian rules are designed to reflect Canada's particular financial and institutional setting. The stated purposes of the rules are (i) to maintain investor confidence and (ii) to harmonize and improve disclosure requirements. Among other requirements, public issuers are now required to disclose off-balance-sheet arrangements that have, or are likely to have, an effect on the results of operations or financial conditions, important contractual obligations, and material forward-looking information in the management discussion and analysis that accompanies their financial statements. To support the reliability of financial disclosure, the rules stipulate that the Chief Executive Officer and Chief Financial Officer of a public company will be required to certify the accuracy of the financial statements and management discussion and analysis. Moreover, reporting issuers must have an independent and financially literate audit committee with prescribed duties.

In May 2004, the federal government proposed an amendment to the Canada Business Corporations Act (CBCA) to improve the corporate governance standards of Canadian companies. The CBCA sets the regulatory framework for all federally incorporated business corporations, excluding financial institutions. Some of the issues being considered are the role and composition of boards, auditor oversight and independence, and financial reporting and offences.

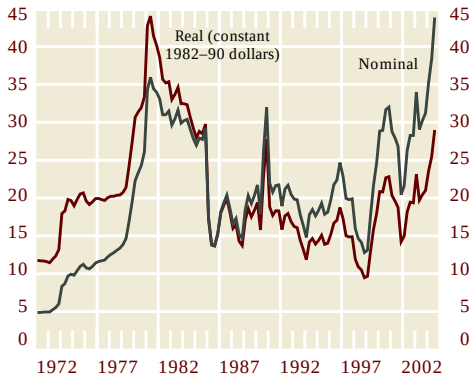
In October 2004, the CSA published a national proposal that would require issuers listed on the TSX to disclose their corporate governance practices with reference to specific guidelines. Companies listed on the junior TSX Venture Exchange would, pursuant to this proposal, be required to disclose only their general practices. These new rules are targeted to come into effect in time for the 2005 proxy season.

Conclusion

These are just a few of the initiatives underway in Canada designed to bolster trust and confidence in financial markets. Given their recent implementation and the evolving nature of corporate governance, it will be important that their contribution to the efficiency of the Canadian financial system be assessed periodically.

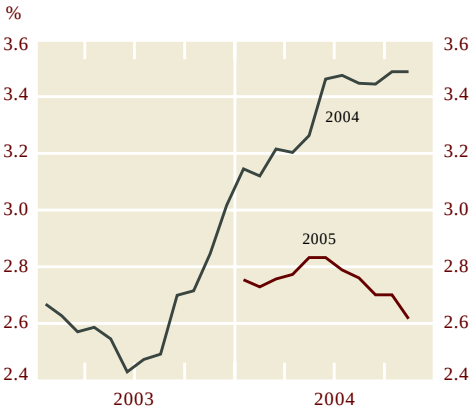
Chart 17 Oil Prices

US$ per barrel, quarterly averages



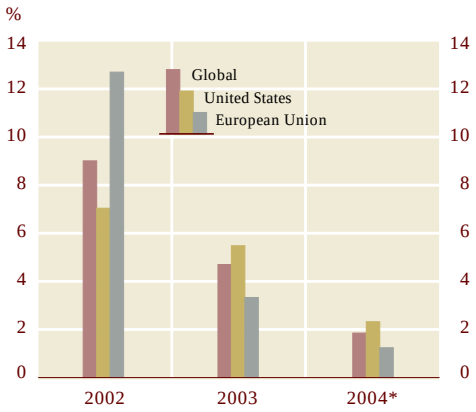
Source: Bank of Canada

Chart 18 Evolution of Consensus Estimates for Annual Growth of Industrialized Economies*



* North America, Western Europe, and Japan
Source: Consensus Economics Inc. and Bank of Canada calculations

Chart 19 Default Rates on Speculative-Grade Bonds



* 12 months to October
Source: Standard & Poor's

The Macrofinancial Environment

Financial vulnerabilities in Canada and elsewhere have continued to subside since the June *Review*, aided by the solid pace of the global economic expansion. Nevertheless, high levels of debt for many borrowers worldwide could pose some challenges in an environment of rising interest rates. At the same time, financial institutions in many countries, including Canada, are in a sound position, while others are working to improve their balance sheets. These efforts will further enhance the financial system's ability to withstand major adverse shocks.

Global environment

In response to higher oil prices (Chart 17), expectations for economic growth in the industrialized countries in 2004 have stabilized in recent months, whereas the outlook for growth in 2005 has been revised down slightly (Chart 18). Nevertheless, expected growth remains robust, and production levels are approaching capacity limits in some countries. As a result, some central banks have started to reduce the amount of monetary stimulus, and further increases in policy interest rates are anticipated. For instance, financial market participants expect the U.S. federal funds rate to be raised by a further 25 basis points this year and by roughly 100 basis points next year (from the current level of 2 per cent).

Improved corporate profitability and ongoing favourable financing conditions have contributed to a further decrease in various indicators of financial distress. For instance, according to Standard & Poor's, the global corporate default rate for speculative issuers, based on a 12-month rolling average, fell to 1.9 per cent in October from 4.7 per cent at the end of 2003 (Chart 19).[19]

Globally, financial market conditions have remained favourable since the completion of the June *Review*, and volatility has been low. Nevertheless, the surge in oil prices since early August has created some unease.

19. The average rate over the 1981–2003 period was 5.3 per cent.

Box 3

Assessing Credit Risk in IMF Lending

The increased use of exceptional access to IMF lending, resulting from capital account crises in emerging-market economies, has led to a greater concentration of Fund credit. In 2002, in recognition of the increased risk associated with the IMF's exposures to a few, large borrowers, the Executive Directors approved a doubling of precautionary balances to about SDR10 billion. The Executive Directors have also asked the staff to review possible analytical approaches to assessing the adequacy of precautionary balances (IMF 2004).

While concentration risk in the IMF's portfolio is not new, what has changed is the composition of IMF borrowers. Under the Bretton Woods system of fixed exchange rates, all member countries could expect to find themselves on both the creditor and debtor side of the balance sheet. But by the 1980s, the industrial countries that were once on both sides of the balance sheet emerged to become permanent creditors. Consequently, the IMF has gradually evolved to become a lender to higher-risk emerging-market countries. Moreover, the term of Fund programs has lengthened, and in some cases, programs have been followed by back-to-back successor arrangements. Larger loans for longer periods to a relatively small group of emerging economies has arguably increased the risks being borne by the Fund, all other things being held equal.

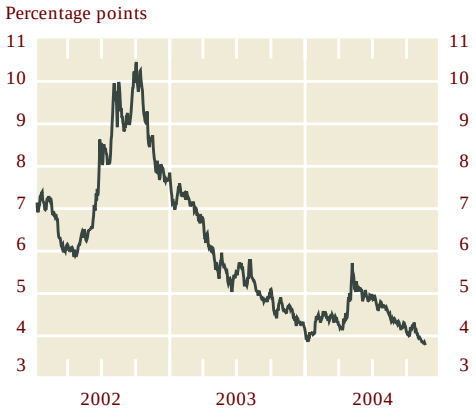
To assess the degree of credit risk in the IMF's portfolio, a measure of expected credit loss (ECL) was constructed using sovereign credit ratings. When credit ratings were not available, ratings were estimated using macroeconomic and institutional information. Expected credit loss was then constructed as follows: For every year, the IMF's exposure under the General Resource Account for each country is multiplied by the respective country's default rate and then summed across all borrowing countries:

$$ECL_t = \sum_{i=1}^{n} EXP_{it} \times (DEF_{it} \times LGD),$$

where ECL_t is the expected credit loss at time t, EXP_{it} is the IMF's exposure to country i, DEF_{it} is the respective default rate associated with the country's actual or estimated sovereign credit rating, and LGD is the percentage loss, given default assumed constant across countries and time. We find that ECL had increased over time. While ECL averaged SDR550 million between 1990 and 1998, by 2003 it had increased to over SDR2.9 billion. As a percentage of total loans, ECL in 2003 was nearly 4.6 per cent—twice the average of the 1990s.

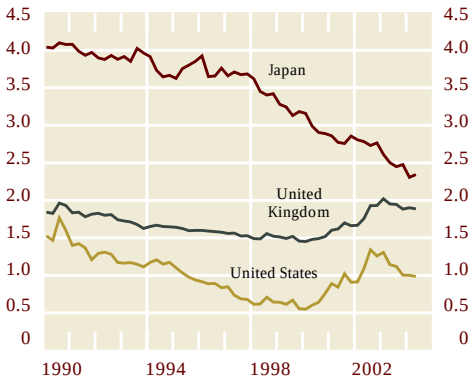
The calculation of a simple expected credit-loss metric confirms priors that credit risk has increased at the Fund in the last decade. Critics of this credit-risk approach would argue that any measure of ECL is inappropriate, given the unique nature of the Fund's balance sheet and the lack of defaults over its 60-year history. Moreover, critics would underscore that the existence of the Fund's preferred-creditor status and economic policy conditionality imply that the IMF faces lower credit risk than suggested by any conventional credit-risk model. While true, in lieu of more standard risk-management techniques, the IMF may have to rely more heavily on its preferred-creditor status, and the effectiveness of conditionality to protect the integrity of its balance sheet, given the structural change in its lending behaviour.

Chart 20 Emerging-Market Bond Index (EMBI+) Spread over U.S. Treasuries



Source: J.P. Morgan Chase & Co.

Chart 21 Corporate Debt-to-Equity Ratios



Note: Country data are not necessarily comparable.
Source: U.S. Federal Reserve and Thomson Financial Datastream

Vulnerabilities to rising interest rates in the external economy

Most financial system participants appear well positioned to face the prospect of rising interest rates. Higher interest rates would likely occur in the context of solid economic activity, sustained employment gains, and robust growth in income. As a result, higher borrowing costs would not likely lead to adverse effects on the financial system, although some highly indebted individual borrowers or countries could experience financial strain.

Spreads on emerging-market assets have decreased significantly in recent months, after having increased sharply between the end of April and mid-May 2004, following the prospect of an earlier-than-expected tightening by the U.S. Federal Reserve (Chart 20). As discussed in the June *Review*, there remains a risk of a possible sell-off of emerging-market assets should interest rates in industrial countries rise more quickly and/or higher than currently expected. According to Standard & Poor's, a moderate rise in global interest rates would not severely affect the credit quality of emerging-market bonds, but a larger increase could put added pressure on the credit rating of some of these countries.[20]

In the event of a marked deterioration in the credit quality of emerging-market issuers, creditors, both private and official, could be adversely affected. Questions could even be raised regarding the balance sheet of the International Monetary Fund (Box 3). But there is every reason to believe that the IMF's financial position will continue to remain strong because of the combination of its existing frameworks for lending and dealing with arrears, its increased use of debt-sustainability analysis in guiding lending decisions, and the maintenance of its preferred-creditor status.

In many industrial countries, corporations have worked hard to repair their balance sheets

20. Standard & Poor's (2004). Two scenarios are considered. In the first, yields on U.S. 10-year Treasuries rise steadily to 5.8 per cent in 2008 from an average of 4.3 per cent in 2004. The second scenario assumes an increase to 7.3 per cent over the same period. The report analyzes the effect of such scenarios on the fiscal position of a few sovereign issuers rated investment grade as well as a few rated below investment grade.

since 2002. They have reduced their indebtedness (Chart 21), improved their liquidity positions by extending the maturity profile of their debts, and improved their profitability (Chart 22). Although the improvement has not been uniform among countries, corporations in many industrial countries appear well positioned to cope with higher interest rates.[21]

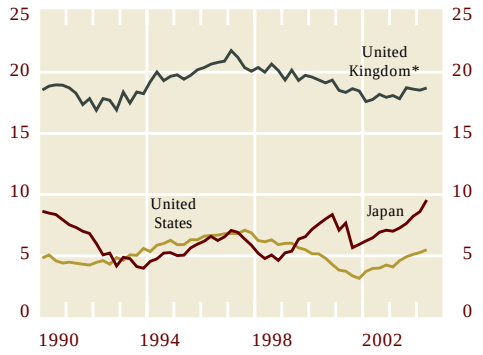
In contrast to the situation of corporations, households in most industrialized countries have continued to increase their debt load (Chart 23). However, a large share of household debt is mortgage related and is as such supported by the value of the property financed. As a result, household indebtedness is not viewed as posing financial system risks in most countries.

Financial institutions in most industrial countries seem well placed to cope with the risks discussed above in the event that they materialize. They have continued to report robust profits and maintain a substantial amount of capital (Chart 24). In Japan, corrective measures, which have been adopted to address the vulnerabilities of the banking sector, are having visible positive effects.[22]

The discussion on "Global imbalances" on page 12 of the June *Review* also remains topical, as external imbalances in the United States, which mirror external imbalances elsewhere, continue to be a source of uncertainty for the global financial system.Various policy or structural changes are required to facilitate the reduction of these imbalances. One such adjustment is taking place. Since the June *Review*, there has been a general depreciation of the U.S. dollar on a trade-weighted basis.

Chart 22 Corporate Profits

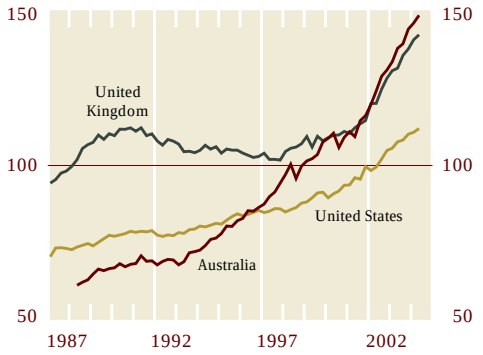
Percentage of GDP



* Includes depreciation, unlike profits of other countries depicted
Note: Profits are defined differently in the countries depicted, so comparisons of profitability should not be made.
Source: U.S. Bureau of Economic Analysis, Thomson Financial Datastream, and Bank for International Settlements (BIS)

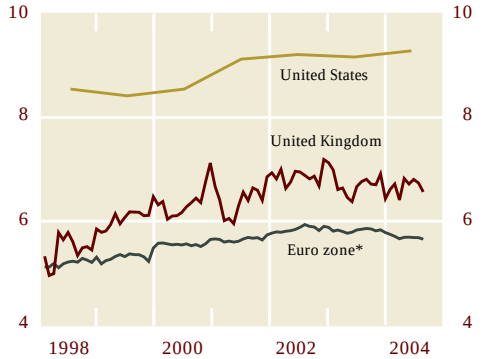
Chart 23 Household Debt

Percentage of disposable income



Note: Country data are not necessarily comparable.
Source: U.S. Federal Reserve, Thomson Financial Datastream, and BIS

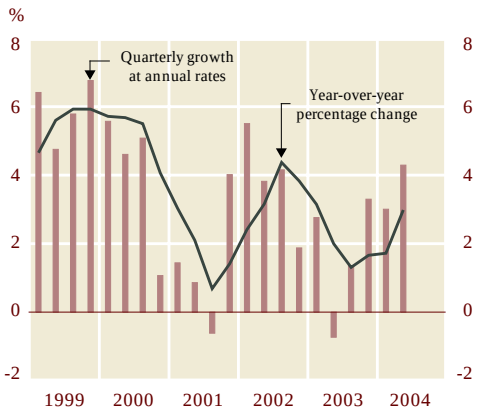
Chart 24 Ratio of Equity Capital to Total Assets: Aggregate Banking Sector



* Monetary and financial institutions for the euro zone
Note: Country data are not necessarily comparable.
Source: Federal Deposit Insurance Corporation and Thomson Financial Datastream

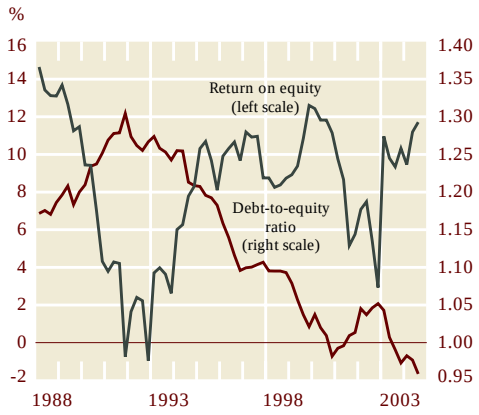
21. In the June 2004 issue of the *Financial Stability Review*, however, the Bank of England expressed the view that U.K. corporate indebtedness was above its long-run desired level.
22. Owing to ongoing restructuring efforts and improved economic conditions, three of the four major Japanese banks marked a return to profitability, with declining loan losses (as a share of total loans) and a rising capital-adequacy ratio for the year. This strong performance is reflected in the Moody's July 2004 upgrade of the credit ratings of four Japanese banks. Nevertheless, many individual banks are still weak, especially regional banks. In addition, although capital-adequacy ratios appear satisfactory, a large share of capital, about 30 per cent for the sector, still consists of deferred tax assets.

Chart 25 Real GDP Growth: Canada



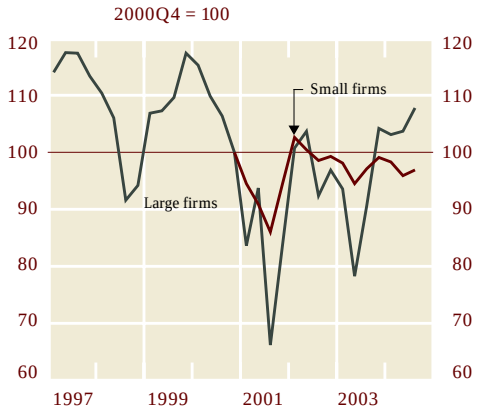
Source: Statistics Canada

Chart 26 Financial Position of the Canadian Non-Financial Corporate Sector



Source: Statistics Canada and Bank of Canada

Chart 27 Canadian Business Confidence



Source: The Conference Board of Canada and CFIB Research

Canadian Developments

Canadian economy

Canada experienced substantial economic growth in the first half of 2004 (Chart 25). In particular, increases in both final domestic demand and exports were quite strong. Continued strong growth of final domestic demand is expected to contribute importantly to solid economic expansion through to 2006. While further global economic expansion should imply ongoing gains for Canadian exports, this is likely to be more than offset by faster growth in imports. Indeed, the appreciation of the Canadian dollar since early 2003 is expected to dampen the growth of Canada's exports and boost that of imports through 2005.

Corporate sector

The financial situation of the non-financial corporate sector improved still further in the first three quarters of 2004. Profitability strengthened between the end of 2003 and the third quarter of 2004, and leverage continued to be very low (Chart 26). In particular, profitability improved considerably in most industries with a high exposure to international trade, given stronger output growth and substantial increases in selling prices, notwithstanding the appreciation of the Canadian dollar. Profit levels also remained quite high in most sectors with a low exposure to international trade.

The surge in the prices of both energy and non-energy commodities so far in 2004 contributed to the increases in selling prices and thus had important effects on the profitability of certain sectors.[23] Profits in commodity-producing sectors rose considerably in the first three quarters of this year. On the other hand, profitability in some sectors that use commodities intensively (e.g., air transportation) has been adversely affected, especially in cases where firms had limited ability to pass on their higher costs in the form of increased selling prices. At the same time, other industries with relatively high material costs (e.g., chemical manufacturing) still experienced marked gains in profits because of

23. The general increase in commodity prices chiefly reflects the strong global economic recovery. The effects on profits have been limited in the short run, by hedging (by both commodity producers and consumers) and by the presence of long-term pricing contracts.

substantial increases in demand and, hence, marked rises in output and product prices.

Given the overall improvement in profitability, the confidence of large firms has remained robust (Chart 27). On the other hand, the confidence of small firms has eased slightly since the end of 2003, reflecting the adverse impact of much higher insurance and energy costs.[24]

Industry

A limited set of industries have continued to be under some degree of financial stress so far in 2004. These industries account for only about 13 per cent of the capital of the non-financial business sector, and so the risks they pose to the financial system are limited.

The profitability of Canada's auto manufacturing industry recovered markedly in 2003 and the first three quarters of 2004 (Chart 28). Rates of return for auto parts producers are likely to ease considerably over the coming months because of much higher raw materials costs (as long-term contracts are renegotiated) and the threat of overseas competition.

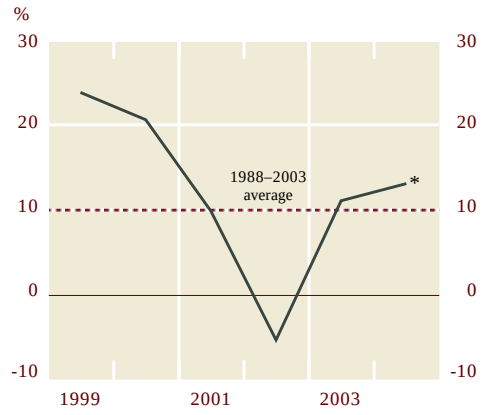
Profitability in the wood and paper industry fell considerably in late 2003 and early 2004, chiefly as a result of the substantial appreciation of the Canadian dollar and much higher energy costs (Chart 29). Stronger product prices (especially for building products) boosted profits in the second and third quarters of 2004. But with the substantial drop in these prices since mid-September and the subsequent appreciation of the Canadian dollar, profits are likely to ease markedly towards year-end.

Profitability in the electronic and computer manufacturing industry remained low in the first three quarters of 2004, despite a substantial recovery in production since late 2002 (Chart 30). Ongoing intense competitive pressures, particularly in the market for telecom equipment, are likely to result in continued low rates of return over the near term.

The financial position of the Canadian air transport industry improved so far this year, reflecting both the impact of restructuring measures and recent gains in air traffic. But the sharp rise

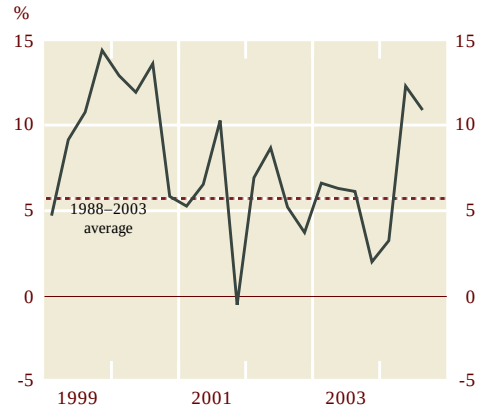
24. See the Highlighted Issue on page 5 of this *Review* for a discussion of the potential impact of expected increases in interest rates on Canadian corporate balance sheets.

Chart 28 Return on Equity: Automotive Manufacturing



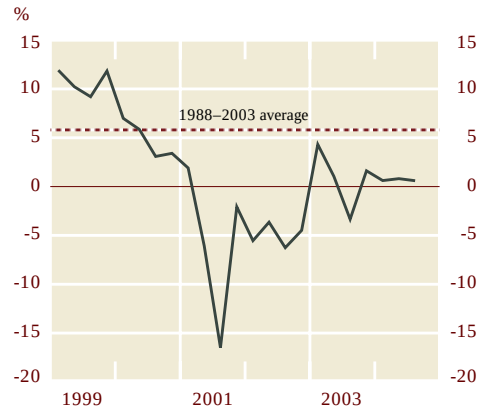
* Estimate
Source: Statistics Canada

Chart 29 Return on Equity: Wood and Paper Manufacturing



Source: Statistics Canada

Chart 30 Return on Equity: Electronics and Computer Manufacturing



Source: Statistics Canada

Chart 31 Canadian Dollar Exchange Rate

* Euro, yen, U.K. pound, Swedish krona, and Swiss franc
Source: Bank of Canada

in fuel costs has been an important offsetting factor. As well, some Canadian aircraft suppliers have come under intensified financial pressure as a result of the increased financial stress of some of their major U.S. customers.

The financial situation in Canada's cattle industry remains weak because of the continuing ban on exports of live cattle, imposed after the discovery of BSE in Canada. With insufficient Canadian slaughtering capacity, there is an important risk that Canadian cattle prices will remain low for some time to come. However, federal and provincial governments have promised further financial aid to the industry.

Over the near term, the financial positions of many industries with a strong net export orientation—and no offsets such as a further rise in world demand or in commodity prices—are likely to be adversely affected by the further strengthening of the Canadian dollar in the past few months (Chart 31). The adverse impact on profitability among industries already experiencing financial stress would likely be especially pronounced for wood and paper products, auto parts manufacturing, and electronic and computer manufacturing. However, it is unlikely that financial institutions with well-diversified portfolios would be strongly affected overall by the worsening financial situation in such industries.

The Financial System

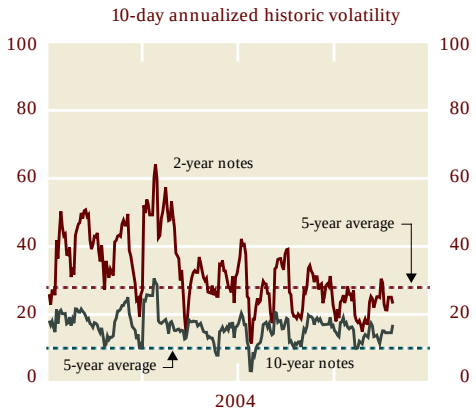
Financial markets

Recent developments in financial markets have been driven by factors relating to global economic growth and the removal of monetary stimulus. Thus far, market reaction to the removal of monetary stimulus has been orderly. Indeed, volatility has remained subdued, as both bonds and equities continue to trade in relatively narrow ranges (Chart 32). Sources of risk to global financial markets remain, however. These include the recent surge in oil prices, and the possibility that interest rates may rise by more and faster than expected.

Adapting to higher policy interest rates

As noted earlier, several central banks have already started to reduce monetary stimulus. The timing and magnitude of the tightening to date has, however, been widely anticipated by market

Chart 32 Volatility of Yields on 2-Year and 10-Year U.S. Notes



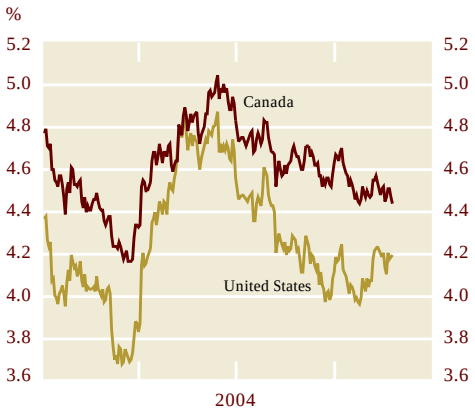
Source: Bank of Canada

participants and, thus, has not led to an increase in market volatility.

Overall, the impact of higher policy rates on longer-term yields in Canada and in the United States has been relatively muted (Chart 33). Their effect on 10-year yields in both countries has been largely counterbalanced by concerns from market participants about the sustainability of the U.S. recovery (and its impact on Canada).

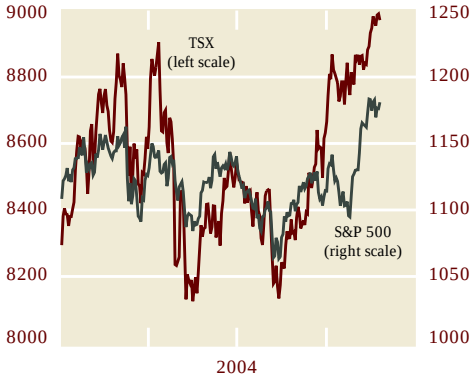
To date, higher short-term interest rates have not had a material impact on other asset classes. Equity markets have generally traded within a narrow range in 2004 (Chart 34). While expected earnings respond negatively to higher interest rates, they have, nonetheless, remained strong, owing to robust global economic activity. The risk that the pace and magnitude of interest rate increases prove to be greater than currently expected, and the resultant impact on asset prices, including equities, remains.[25]

Chart 33 Yield on U.S. and Canadian 10-Year Notes/Bonds



Source: Bank of Canada

Chart 34 North American Stock Market Indexes



Source: Bank of Canada

Oil prices

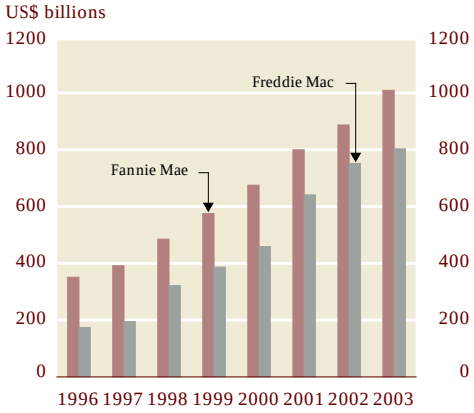
Currently, the main risk to global financial markets relates to the surge in oil prices to record nominal highs, and its impact on longer-term global growth prospects and financial market volatility (Chart 17). If high energy prices persist, they will affect financial markets through various channels, including a dampening effect on earnings and thus on equity prices of non-energy companies, as well as through changes in nominal exchange rates. The net impact of high oil prices on fixed-income markets is likely to be more ambiguous because such prices could potentially temper global economic growth, and thus put downward pressure on yields. They could also result in higher inflation, and thus put upward pressure on yields. Given the underlying low-inflation environment and well-anchored inflation expectations, however, market participants expect high oil prices to have their major impact on economic growth.

Government-sponsored enterprises

The Office of Federal Housing Enterprise Oversight (OFHEO) in the United States, which regulates government-sponsored enterprises

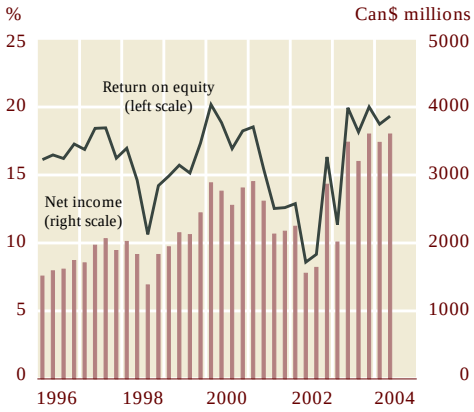
25. See the June 2004 *Review*, pages 4-8 for a detailed discussion of factors affecting the prices of financial assets, including prospects for higher interest rates and the risks to asset valuations. That discussion remains current.

Chart 35 Total Assets: Fannie Mae and Freddie Mac



Source: Fannie Mae and Freddie Mac

Chart 36 Bank Profits



Source: Banks' quarterly financial statements

(GSEs),[26] recently released a report critical of Fannie Mae's accounting policies. Specifically, the OFHEO found pervasive manipulation of earnings. The manipulation asserted in the OFHEO report was allegedly designed to smooth earnings volatility and help meet earnings expectations. Furthermore, the report suggested that Fannie Mae may have violated accounting rules in the way that it accounted for derivative products used to hedge its underlying mortgage positions.

Although the effect of these findings on financial markets has so far been modest and relatively isolated, a risk exists that further negative developments concerning U.S. GSEs more generally, in light of their scale and level of participation in financial markets, could have important negative effects on financial market stability. While this impact would be largely in U.S.-dollar markets, given the tight linkages between U.S. and Canadian fixed-income and derivatives markets, there is the potential for spillover effects into Canadian markets.

Fannie Mae is America's third-largest financial corporation in terms of assets and plays a key role in financing home mortgages in the United States (Chart 35). It is also the second-largest issuer, behind the U.S. Treasury, of U.S.-dollar securities and a significant participant in the interest rate derivatives market. As such, any material change in the firm's use of derivatives as hedging instruments has the potential to significantly affect U.S.-dollar interest rate swap and options markets.

Since the release of the OFHEO report, Fannie Mae has agreed to hold 30 per cent more capital against loans than previously required by the regulator. This decision on capital holdings is identical to that agreed to by Freddie Mac last year, following findings of similar accounting irregularities. As well, Standard & Poor's has placed the agency's subordinate debt and preferred stock on CreditWatch with negative implications.

Although much attention has focused on the reporting problems of Fannie Mae and Freddie Mac, their senior debt continues to carry the

26. U.S. housing-related GSEs, such as Fannie Mae and Freddie Mac, are congressionally chartered companies owned by private shareholders. They acquire home mortgages from the lenders that initially extended credit and aim to help low- and moderate-income Americans purchase homes.

Box 4

OSFI's New Guideline B-5 and the Canadian ABCP Market

On 23 November, the Office of the Superintendent of Financial Institutions (OSFI) published a revision to its Guideline B-5 for asset securitization transactions. Many of the changes aim to align Canada's regulatory treatment of securitization with that of other countries. The revision also clarifies a number of old B-5 provisions.

The revisions that may have the most significant impact on the Canadian financial system are those pertaining to facilities for enhancing the liquidity of asset-backed commercial paper (ABCP). They remove a major impediment to the potential growth of the Canadian ABCP market. This should impart greater efficiency to Canadian-dollar capital markets.

Because the assets that comprise the collateral are typically of longer maturity than the ABCP financing them, some sort of liquidity buffer is needed to protect against rollover risk and timing mismatches. Hence, ABCP issuance programs purchase liquidity protection. At a minimum, in the old B-5 such protection should have safeguarded against what it called a "general market disruption" (GMD), which was never defined but was interpreted by market participants to mean a situation in which "not a single dollar of corporate or asset-backed commercial paper can be placed in the market at any price."

Because Standard & Poor's and Moody's viewed Canadian liquidity enhancements as too restrictive, they have been reluctant to give their highest investment-grade ratings to Canadian ABCP. But if a Canadian bank provided less-restrictive liquidity, it would, at a minimum, incur increased regulatory capital charges that would make the ABCP less economical.

The new B-5 defines a GMD as a "disruption in the Canadian commercial paper market resulting in the inability of Canadian paper issuers, including the SPE, to issue any commercial paper, and where the inability does not result from a diminution in the creditworthiness of the SPE or any originator or from a deterioration in the performance of the assets of the SPE."[1] This would allow the liquidity facility to be tapped in the event of any non-credit disruptions, satisfying Moody's and Standard & Poor's standards to provide their highest investment-grade ratings to Canadian ABCP, while still retaining a zero capital charge.

Furthermore, the new B-5 acknowledges that the liquidity facility might not even need to include GMD as a restriction, leading to the type of liquidity support common in other markets. However, the use of this alternative would also come at the cost of capital charges, as outlined in the Basel II Framework. Moody's and Standard & Poor's have both suggested that this approach might also meet their highest short-term rating standards.

Hence, with the new B-5 it will be possible for Canadian banks to offer expanded liquidity protection to Canadian ABCP programs on a cost-effective basis. Although it is premature to speculate which, if any, of the new liquidity options the banks will adopt, and therefore whether Moody's or Standard & Poor's will be able to give Canadian ABCP their highest short-term ratings, it appears that the Canadian market will at least have that option.

Although Canada's Dominion Bond Rating Service (DBRS) already gives Canadian ABCP their highest short-term rating, many institutional investors require two ratings for investments to be acceptable. Hence, the new B-5 could significantly broaden demand for Canadian ABCP and give corporate borrowers expanded and lower-cost access to financing.

1. An ABCP program bundles together numerous assets into a "special-purpose entity" (SPE), which in turn, issues marketable securities.

highest (AAA) rating assigned by the three major global rating agencies on the strength of the implicit government guarantee. Although their subordinate debt is rated at AA- and is on CreditWatch, the default of Fannie Mae or Freddie Mac is deemed highly unlikely.

Regulatory and other developments

On 26 June 2004, central bank governors and the heads of bank supervisory authorities in the Group of Ten (G-10) countries endorsed the publication of the "International Convergence of Capital Measurement and Capital Standards: a Revised Framework," the new capital-adequacy framework commonly known as Basel II.

This framework should improve the stability of the financial system as a whole. It sets out the details for the adoption of more risk-sensitive minimum capital requirements by banking organizations.[27] The new framework reinforces these risk-sensitive requirements by laying out principles for banks to use in assessing the adequacy of their capital and for supervisors to use when reviewing such assessments so that banks have adequate capital to support their overall level of risk. Basel II also seeks to strengthen market discipline by enhancing transparency in banks' financial reporting. The implementation of the new framework is expected to commence in member jurisdictions as of year-end 2007.

In Canada, in November 2004, the Office of the Superintendent of Financial Institutions (OSFI) published revisions to its Guideline B-5 for asset transactions. Many of the revisions aim to align Canada's regulatory treatment of securitization with those of other countries. Box 4 outlines how these revisions may encourage growth in the Canadian market for asset-backed commercial paper.

The securities industries of Canada and the United States plan to move to straight-through processing (STP) to clear and settle securities transactions.[28] STP should increase the operational efficiency of the securities-settlement process. The Bank of Canada supports the efforts of the Canadian Capital Markets Association (CCMA) and all Canadian industry and regulatory participants to take the necessary steps to achieve STP capability.[29] To move towards this objective, the CCMA has, since the June 2004 *Review*, decided to realign its key priorities. It will now focus its efforts on achieving institutional trade-date matching (agreeing to the details of a trade on the day the trade was executed), the area considered to be the largest hurdle for the Canadian marketplace to overcome in achieving STP.

Financial institutions

The major Canadian banks reported continued strong profitability through their first three fiscal quarters of 2004. Average return on equity in the third quarter was 19.3 per cent, compared with 18.7 per cent in the second quarter and 16.5 per cent for 2003 as a whole (Chart 36).

To date in 2004, the diversified business strategy of the major Canadian banks has been supportive of continued gains in profitability. Although there were some notable differences among the banks, in aggregate, the major segments of their diversified business strategy performed well. Credit performance continued to strengthen, as provisions for loan losses as a share of average assets declined to 0.04 per cent in the third quarter of 2004 (Chart 37). Results from foreign operations remained mixed, however.

The major Canadian banks continue to report high capital levels (Chart 16), well above minimum requirements. From a financial stability perspective, the strong capital position of the Canadian banking system may provide a buffer to absorb unexpected shocks that could negatively affect banks. These high levels of capital provide banks with the reserves from which they may choose to carry out future acquisitions, as well as continuing to raise dividends and/or conduct common share repurchase programs. Indeed, TD Bank Financial Group announced the purchase of a $5 billion controlling interest in Banknorth Group of Maine. The deal, which is subject to approval by Banknorth's shareholders

27. The article "Basel II and Required Bank Capital" on page 61 of this *Review* examines some potential implications of these changes.
28. STP is defined as the seamless passing of information electronically—on a timely, accurate, system-to-system basis—to all parties in the end-to-end chain of a securities transaction without manual handling or redundant processing. See the Box on page 25 of the June 2004 *Review*.
29. Created in August 2000, the CCMA serves as a forum for industry experts to provide leadership and coordinate the industry-wide implementation of STP.

and by U.S. and Canadian regulatory authorities, is expected to close in February 2005.[30]

The life insurance industry continued to report solid financial performance in the first three quarters of 2004, with the three largest Canadian insurers reporting a return on equity of about 15 per cent (Chart 38). Strong balance sheets, firm sales in most product lines, and good geographical diversification helped insurers sustain profitability.

The profitability of the property and casualty insurance industry, which experienced a significant gain in 2003, stabilized in the first three quarters of 2004. Rising premiums and improved investment income allowed the industry to report a return on equity of about 18 per cent so far in 2004, following 11.3 per cent in 2003, and only 1.7 per cent in 2002. There is still uncertainty, however, surrounding the prospects for the performance of this industry in light of increasing competition. The automobile market, which accounts for more than one-half of all premiums collected, faces particular challenges. Some provincial governments implemented premium rollbacks or rate freezes in 2003–04 in exchange for cost savings for the auto insurance industry (in the form of legislated reforms expected to reduce adverse claims). The effect of the reduced premiums on industry rates of return are, however, expected to be greater in 2005 as premium reductions are fully passed on to holders of auto insurance (Chart 39).

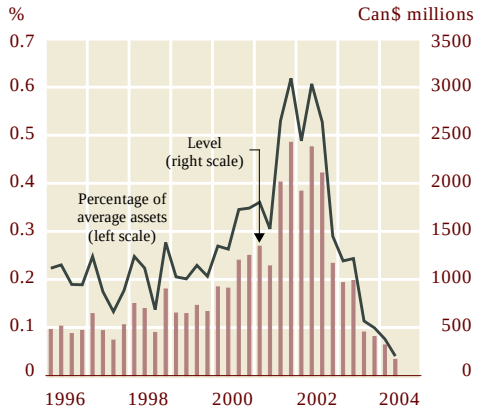
In late October, the New York Attorney General sued Marsh & McLennan, the world's largest insurance broker, on the basis that it received special payments (known as contingent commissions) from insurance companies that were charging above-normal commissions. Although there has been a significant impact on the market value of the equity of most insurance firms, including Canadian firms, it is not clear to what extent the investigation in the United States will affect the Canadian insurance industry.[31]

Clearing and settlement systems

Clearing and settlement systems are a key component of the financial system, allowing payments and other financial obligations to clear

30. Other, smaller foreign acquisitions by major Canadian banks have also taken place.
31. In 2004, Canadian property and casualty insurers paid out special commissions to insurance brokers.

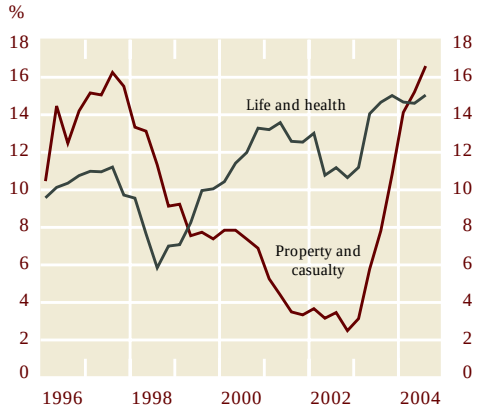
Chart 37 Bank Loan-Loss Provisions



Source: Banks' quarterly financial statements

Chart 38 Return on Equity of Insurance Industry

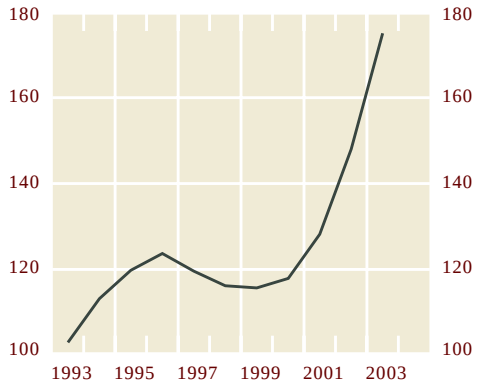
4-quarter moving average



Source: OSFI and Bank of Canada calculations

Chart 39 Average Nominal Premiums Written: Private Passenger Vehicles*

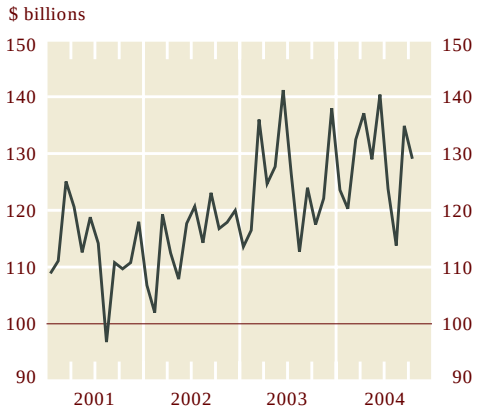
Annual index (1992=100)



* Figures represent the average premium across six provinces: ON, ALTA, NS, NB, NFLD, and PEI
Source: Insurance Bureau of Canada

Chart 40 Value of Payments Processed by the LVTS

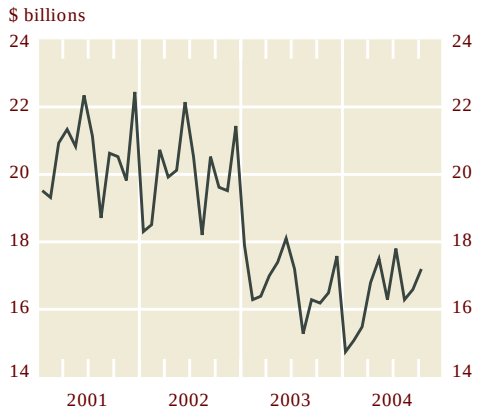
Average daily amount per month



Source: Canadian Payments Association

Chart 41 Value of Payments Processed by the ACSS

Average daily amount per month



Source: Canadian Payments Association

and settle. The Bank of Canada supplies services to a number of these systems, including the Large Value Transfer System (LVTS), for settling large-value or time-sensitive payments; the Automated Clearing Settlement System (ACSS), used mostly for smaller-value retail and some electronic payments; the CDSX, Canada's securities settlement system; and the Continuous Linked Settlement Bank (CLS), an international system for the settlement of foreign exchange transactions. Because of their systemic importance, the Bank has formal oversight responsibilities for the LVTS and the CDSX, and shares oversight responsibilities with other central banks whose currencies are included in the CLS Bank.[32]

Recent developments

Payment flows in the LVTS grew modestly in the first three quarters of 2004 compared with the same period in 2003, increasing by 3 per cent from year-earlier levels to an average of $129 billion per day (Chart 40). On 2 July, the first day following the 1 July holiday—a day generally associated with large payment flows—a record number of transactions (about 29,000 with a value of $163 billion) settled through the LVTS.

A continuing factor in the growth of LVTS payment flows has been the migration of large-value payments from the ACSS. The average daily value of payments sent through the ACSS fell by about $0.7 billion compared with the same period in 2003, to average about $16 billion in the first three quarters of 2004 (Chart 41). ACSS payment flows, which are not as well protected against risk as those in the LVTS, have been on a downward trend in the last four years and are now about $5 billion below the daily average in 2000.

On 18 October, a new participant, State Street Bank and Trust Company, began operating in the LVTS, bringing the number of LVTS participants to 15 (including the Bank of Canada). This is the first new participant to join the LVTS since it began operations in February 1999.

October 2004 signalled the successful completion of a 12-month transition period of the risk model for CDSX, Canada's system for settling virtually all securities denominated in Canadian

32. The Federal Reserve is the lead overseer for the CLS Bank.

dollars. In March 2003, CDSX became operational for the settlement of debt. Equities were added in July 2003. To complete the transition period, The Canadian Depository for Securities Ltd. (which owns and operates CDSX), participants, and regulators worked on several issues, proposing solutions that ultimately led to rule amendments and technical adjustments to implement the new features of the system.

Foreign exchange trades settled by the CLS Bank continue to grow. For the 11 eligible CLS currencies combined, the volume of sides settled in the first three quarters of 2004 averaged 126,000 per day, up 70 per cent from a year earlier, for an average daily value of US$1.4 trillion.[33] The value of sides settled reached a record US$2.5 trillion on 15 September.

For transactions involving the Canadian dollar, the value of trades settled by the CLS averaged Can$25 billion per day in the first three quarters of 2004, an increase of about 58 per cent from year-earlier levels (Chart 42). The value of funds required to settle these transactions, relative to the value of the transactions themselves, has trended down to average about 7.5 per cent in the third quarter of 2004. This ratio represents a measure of the liquidity savings provided by CLS settlement and compares with a liquidity ratio for trades settled by the CLS in all currencies combined of just over 2 per cent. In June 2004, an additional Canadian bank began settling trades through the CLS. It is still the case, however, that the majority of large Canadian banks do not yet settle the bulk of their foreign exchange trades through the CLS.

Preparations are underway to include four additional currencies in CLS settlement. These are the Hong-Kong dollar, the Korean won, the New Zealand dollar, and the South African rand. Settlement will begin once all technical requirements are met and assuming all regulatory and CLS approvals are received.

On 31 May 2004, a major Canadian bank experienced a computer problem whose effects were not fully resolved until 8 June. The most severe consequence of this problem was at the retail

Chart 42 Canadian-Dollar Foreign Exchange Trades Settled by the CLS Bank

Average daily amount per month

Source: The CLS Bank

33. The 11 currencies currently eligible for settlement by the CLS Bank are the Australian dollar, the Canadian dollar, the Danish krone, the euro, the U.K. pound, the Japanese yen, the Norwegian krona, the Singapore dollar, the Swedish krona, the Swiss franc, and the U.S. dollar.

level, because the problem affected the ability of this bank to update its client accounts (which had widespread repercussions across Canada). These events did not, however, cause significant disruptions to the operation of systemically important clearing and settlement systems in Canada. More recently, two other banks experienced technical problems affecting their retail activity.

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Reports

Introduction

Reports address specific issues of relevance to the financial system (whether institutions, markets, or clearing and settlement systems) in greater depth.

The ability of households and firms to confidently hold and transfer financial assets is one of the fundamental building blocks of the Canadian economy, as is the manner in which savings are directed to investments. Frictions in financial markets can affect the matching of savers and borrowers, impeding the effective allocation of financial resources. To understand these frictions, the "efficiency" of financial markets must also be understood. The report, *A Taxonomy of Market Efficiency*, describes the three main definitions of market efficiency: informational, operational, and allocative. The author points out that these three definitions are linked, with the degrees of informational and operational efficiency helping to determine the degree of allocative efficiency.

Over the last few years, both institutional and retail investors in Canada have started to place assets in hedge funds. Previously, these were available only to wealthy investors. The increased demand has led to the establishment of a number of hedge funds and "funds of funds" in Canada. To better understand the implications of these developments for the Canadian financial system, the Bank of Canada organized a workshop in June 2004. *Portrait of the Canadian Hedge Fund Industry* describes the nature of these investment vehicles, their weight in the Canadian financial system, and discusses questions raised by the development of this industry in Canada, particularly the factors affecting its growth, regulation, and potential impact on the Canadian financial system.

A Taxonomy of Market Efficiency

Gregory H. Bauer

The Bank of Canada has a long-standing interest in the stability and efficiency of Canadian financial markets. In terms of efficiency, the Bank is concerned with how well the financial system allocates capital between savers and investors.

This article describes the three main definitions of market efficiency: informational, operational, and allocative. These concepts are described as they are used in finance theory.[1] One important point raised is that these three components of efficiency are linked via a hierarchy: the degrees of informational and operational efficiency help to determine the degree of allocative efficiency.[2] Some important policy implications arising from existing research are also examined.[3]

Informational Efficiency

An asset market is informationally efficient when the price of the asset incorporates all the information about its "fundamental value."[4] The definition is further refined depending on the information available to market participants. A market is "weak form" efficient if only the information in past prices is contained in the current price. This rules out using technical trading rules to make excess (i.e., risk-adjusted) returns.[5] A market is "semi-strong form" efficient if all public information is reflected in the asset price. This rules out trading on public information, such as dividend yields or interest rates, to make excess returns. A market is "strong form" efficient if prices contain all private and public information.[6] This rules out making excess returns via insider trading, because the prices already reflect that information.[7]

It is important to note that there is no such thing as a perfectly informationally efficient market (the Grossman-Stiglitz paradox). This can be demonstrated by examining what a perfectly efficient market would entail. In a market where the asset's price contained all private and public information, no one would have an incentive to do any research on the asset because no gains could be made from obtaining superior information. The lack of research implies that there would be no way for information to be incorporated into the asset price in the first place. Thus, the price of an asset could not contain all private and public information.

The best way to describe the informational efficiency of a market is by its degree of relative

1. The definitions provided here were used by Deputy Governor Sheryl Kennedy (2004).
2. For a summary of the evidence regarding Canadian capital market efficiency, see Hendry and King (2004).
3. Although the Bank of Canada does not have legislative authority to design and implement policy in most areas directly affecting informational and operational efficiency, the linkages between these and allocative efficiency motivate the Bank's involvement.
4. The fundamental value of an asset is the discounted sum of expected future cash flows from the asset, where the discount rate is the risk-free rate plus the expected risk premium on the asset.
5. Trading rules are "technical" when they are based only on movements in past prices and volumes.
6. Private (asymmetric) information is information known by sophisticated investors in the market but not known by ordinary investors. This could be (i) insider information about a particular firm; (ii) better forecasts of public information that has not yet been released; or (iii) a clearer understanding of information that is in the public domain. Information in the last two categories can affect either individual firms or groups of firms. In the finance literature, the role of private information on asset prices is examined by studying investors' order flow.
7. Note that trading by insiders may be either legal or illegal, depending on the context. See King and Padalko (2004) for further details.

efficiency. The amount of information in the asset's price is such that the marginal cost of producing the information is equal to the marginal benefit from trading on the information. At any given time, an asset's price does not reflect all available information, however defined. The interesting questions are: (i) how long does it take for information to be incorporated into prices, and (ii) how does the information get into the price? The first question is important because savers will want to know that the price of the asset they are investing in is "fair;" i.e., that they will not be negatively affected by previously known bad news after they invest. The second question relates to market integrity. If insiders have superior information that the asset is overvalued, how do ordinary investors get that information? Do the ordinary investors receive the information after the insiders have (illegally) traded the stock or in a public news release?

Informational efficiency is often confused with the idea of "random walks" in stock prices.[8,9] It is important to note that the two concepts are separate. If the risk premium on stocks is moving over time, then stock prices will change in response to current market conditions. Thus, stock prices will not be a random walk. However, if the market is semi-strong form efficient, no one will be able to make excess returns by trading on public information.

Policy implications

- Most research shows that markets react very quickly to public news announcements (e.g., interest rate shocks). However, such news appears to play a very small role in the dynamics of asset prices. Rather, the bulk of returns and volatility in stock, bond, and foreign exchange markets comes from the revelation of private information. It is therefore important for policy-makers in general to understand why some agents appear to have information superior to that of others and how this private information is released to the market. The Bank's research on market transparency is related to these issues.
- Lessons from previous work on small, open economies carries over to this line of research. Private and public information generated in the U.S. equity and money markets has an impact on Canadian equity prices. (See Albuquerque, Bauer, and Schneider 2004.) Importantly, a portion of this private information is related to the beliefs of sophisticated U.S. investors about the path of future U.S. interest rates (Bauer and Vega 2004).
- In general, smaller firms or markets will likely be less informationally efficient because fewer resources will be devoted to producing market research. This could be worrying for small firms in Canada or for the Canadian corporate bond market in aggregate. In addition, markets in the early stages of development (e.g., the Canadian credit-risk transfer market) are likely to be less informationally efficient and to contain more profit incentives for investors who do research.
- Small amounts of informational inefficiency can significantly affect the price of an asset. Suppose that the price of the asset equals its fundamental value, as described above. Under this definition, future cash flows are discounted by a rate composed of a risk-free rate plus an expected risk premium. Empirical work has shown that the expected risk premium is very "persistent" (i.e., the level of the risk premium next month is closely related to its value this month). If the current expected risk premium is "wrong" because of some inefficiency, the error will carry through to many future periods. Thus, the future cash flows from the asset will be discounted for some time by an expected return that is incorrect. This would significantly affect the current price. Thus, small changes in policies related to improving

8. Stock prices follow a "random walk" if the change in a stock's price cannot be forecast based on any available information.
9. Loosely speaking, an asset's price will follow a mathematical process called a "random walk" if all market participants are risk neutral, something not observed in everyday life. The "random walk" is a statistical model of prices that does not fit many real-world prices.

informational efficiency could have a major impact.[10]

- Tests of informational efficiency are complicated since they must be performed jointly with a test of the predictions of an asset-pricing model. For example, researchers cannot say, that the Government of Canada bond market is (relatively) informationally "efficient" without stating which asset-pricing model is used to evaluate the prices in the market. The problem for policy-makers is that there is no consensus as to the "right" asset-pricing model, suggesting that researchers have to temper their conclusions about informational efficiency. To understand the efficiency of a market, policy-makers must understand how prices are set in that market.

Operational Efficiency

Operational (or transactional) efficiency is a measure of the cost of transferring funds from savers to borrowers. It is thus concerned with transactions costs. In a perfect world, the transactions costs present in a market should (with competition) reflect the marginal costs of providing the services to the market participants.[11]

Work on operational efficiency is often concerned with the "liquidity" of a particular market: can investors trade in "reasonable" size without paying large transactions costs? (See for example, D'Souza 2002.) Finance theory shows that sophisticated investors (those with private information) trade in markets where there are many liquidity-based (i.e., non-informed) investors so that they can hide their trades. Thus, the degree of informational efficiency (larger amount of information in prices) is linked to the degree of operational efficiency (larger amount of liquidity in the market).

Policy implications

- The link between the first two types of efficiency raises concern about attempts to impose transparency on markets (Zorn 2004). Sophisticated investors produce private information on an asset in order to trade on it and make a profit. This information is revealed to the market through the trades and quotes of the investors. This helps make the market more informationally efficient as defined above. Suppose policy-makers cause an operational change by forcing investors to reveal price quotes or trades that they wish to keep private. The investors will then have less incentive to produce that private information. This means that the informational efficiency of the market will decline. This, in turn, means a decline in the market's liquidity, which would hurt non-informed (small) liquidity-based traders.
- There are global implications to this research as well. Barriers to transferring capital across borders can exist because of either formal capital controls or microstructure issues, such as lack of available liquidity, concerns about asymmetric information, etc. Differences in operational and informational efficiency may also cause traders to choose alternative markets in different countries in which to conduct the same trade.

Allocative Efficiency

A market is allocatively efficient when the marginal rate of return (adjusted for risk) is equal for all borrowers and savers. This implies that investors provide funds for projects that have the highest net present value and that no "good" investment projects go unfunded.[12] The concept of allocative efficiency is related to the large body of literature on the investment choices of firms. It is also related to the consumption/saving decisions of consumers. In general, to evaluate whether a market is allocatively

10. An example using the standard Gordon growth model of stock prices illustrates this point. Suppose a stock has a dividend of $1 per year that is expected to grow by 3 per cent per year. Also suppose that the required rate of return on the stock is 5 per cent per year. Under these assumptions, the price of the stock would be $50. Now suppose that a market friction is eliminated, causing the required rate of return of the stock to decline by 25 basis points (to 4.75 per cent per year). In this case, the price of the stock would increase to $57.14.
11. For a good overview of the operational efficiency of the clearing and settlements system, see McPhail (2003).
12. This definition is known to most economists as "Pareto optimality."

efficient requires a very sophisticated model of the economy.

The finance literature is, in general, concerned with a different set of questions. However, an important and very recent strand in the literature looks at the role played by informational and operational efficiency in allocative efficiency. For example, some papers look at how the amount of private information in a market affects the equilibrium required rate of return in the market (Easley, Hvidkjaer, and O'Hara 2002). If investors fear that certain more sophisticated investors possess information or superior knowledge about the asset (and that this information is not currently priced in), then they will demand a higher rate of return on the asset. Another part of the literature looks at the role of liquidity in equilibrium rates of return (Pástor and Stambaugh 2003). It is safe to say that the literature has not sorted out the separate roles played by information and liquidity in asset prices. It is clear, however, that these microstructure phenomena have an effect on equilibrium rates of return. Hence, it is safe to say that microstructure finance no longer provides only "small answers to small questions," which was a common perception of the early literature.

Thus, the amount of allocative efficiency in the market can be viewed as depending on the degree of informational and operational efficiency.[13] Prices will allocate resources in an optimal manner to the degree that they correctly incorporate information about an asset's fundamental value.

Conclusions

Research at the Bank has so far focused on the informational and operational aspects of efficiency in various Canadian capital markets. As noted above, improving informational and operational efficiency can significantly affect asset prices. Thus, changing these aspects via an exogenous policy shock could lead to significant effects on the required rates of return for Canadian corporations and, in turn, change the way funds are allocated in the market. Small policy changes imposed on financial market structure could thus potentially have large effects on real activity. Such policy directives therefore require a great deal of analysis before implementation.

13. Indeed, there are different definitions of allocative efficiency, depending on the information set used to measure the equilibrium outcomes.

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Portrait of the Canadian Hedge Fund Industry

Miville Tremblay

In the early 1980s, a few wealthy Canadian families were investing in large U.S. hedge funds. Ten years later, a handful of institutional investors had joined them. The practice has spread, and today even small investors have access to this method of managing securities through guaranteed-principal notes and closed-end mutual funds. This growing demand stimulated the emergence of Canadian hedge funds and funds of funds. To better understand the rise of this new industry, the Bank of Canada hosted a workshop last June, and this article presents the highlights of those discussions.[1]

The development of hedge funds in Canada is characteristic of an activity that is integrated internationally. Some elements can be identified, but not isolated, as specifically Canadian. This level of integration complicates measurement efforts all the more because data on the global industry are themselves imprecise. There are, in fact, no reliable and complete data on the Canadian component of this industry, and we must, at this point, rely on the judgment of participants to obtain even estimates of its size. The information presented here is from several formal and informal sources that use different methods of compilation. (See the box on page 43 for a description of hedge funds.)

By the end of 2003, there were about 7,000 hedge funds around the world, with total assets of approximately US$800 billion (Hedge Fund Research, Inc. 2004).[2] According to various informal sources, Canadian capital invested in these financial instruments may total up to Can$23 billion.[3] However, a large share of these savings were managed by funds established abroad, mainly in the United States. Funds established in Canada administer over $5 billion in assets, but much of this is from foreign investors. Funds of funds—specialized organizations that manage portfolios invested in several hedge funds—handled $3.7 billion of Canadian capital in 2003, according to Investor Economics (2003).[4] This amount does not include Canadian capital entrusted to funds of funds that are not registered in Canada. Finally, retail sales of products linked to hedge funds have reached $7 billion. This simple statistical overview underscores the breadth of the hedge fund phenomenon in Canada.

Strong Demand

Canadian demand was at first exclusively, and remains largely, satisfied by foreign hedge funds. These funds initially targeted large private fortunes, but it is the growing interest of institutional investors that explains their high growth rate in recent years. In keeping with worldwide trends, Canadian pension funds also seek to diversify their portfolios with new assets, the prices of which are weakly correlated with the prices of stocks and bonds and that generate an absolute return, such as real estate, venture capital, and hedge funds.

While there is a high level of interest in hedge funds, relatively few pension funds have, as yet, made the move into them. Institutions with considerable resources, such as the Ontario Teachers'

1. Most of the speakers at the workshop were representatives of various segments of the Canadian hedge fund industry. We wish to thank them for their valuable contributions.
2. Others have put the number of funds at over 8,000 and have assessed their total assets at nearly US$1 trillion.
3. From here on, all amounts are in Canadian dollars. For purposes of comparison, the market for mutual funds is $475 billion.
4. This includes only funds of funds registered with provincial regulators.

Pension Plan, the Caisse de dépôt et placement du Québec, and OMERS, have established their own portfolios of hedge funds. Some have also set up internal teams that use hedge fund strategies to generate an absolute return. Note that Canadian banks have been using these same strategies for some time in their proprietary trading operations.

Smaller pension funds have tended to play this market using foreign funds of funds, although some pioneers began with direct investments, yielding mixed results. Although they extract higher management fees, funds of funds offer instantaneous diversification, as well as expertise in the selection and monitoring of investments. Pension funds involved in these investments generally allocate 3 per cent of their portfolio, although their ultimate target is 5 to 10 per cent. Overall, Canadian pension funds have placed approximately $10 billion with hedge funds.

The retail market is developing rapidly, especially in Quebec, where the Desjardins Group and the National Bank are selling term deposits and structured notes[5] in which the capital is generally guaranteed and the yield is that of a fund of funds. Such structures have also been set up by independent funds of funds, which use notes issued by Crown corporations for that purpose.[6] The minimum investment may be as little as $500. Northwater, the largest Canadian fund of funds, opted to enter the retail market with closed-end mutual funds listed on the Toronto Stock Exchange.[7] This small-investor market also exists in Europe but not in the United States, where only wealthy individuals and institutions have access to hedge funds.

A Limited Canadian Supply

On the supply side, approximately 150 hedge funds established in Canada can be identified,[8] but most of them have less than $25 million under management. The bulk of the capital managed in Canada—an increasing proportion of which is from foreign funds of funds—is in the hands of only six firms: Sprott Asset Management, Salida Capital, Polar Capital, Leeward Capital, Mapleridge Capital, and J.C. Clark (Cohen 2004).[9] To date, few Canadian institutional investors, including funds of funds, have made direct investments in Canadian hedge funds. Medium-sized money managers, for their part, attract private Canadian investors who are guided by financial advisers. By far the most popular strategy is long/short equities.

To penetrate this lucrative and rapidly growing market, traditional fund managers, such as TD Asset Management, Natcan, and Fiera Capital, recently created portfolios that are handled in the same fashion as hedge funds. These remain small operations, however, when compared with the volume of capital under traditional management.

In Canada, the funds of funds sector is relatively more developed and growing more rapidly than the hedge fund sector. Aside from Northwater, the largest independent firms include Norshield, Maple Partners, Tricicle, HR Strategies, and Arrow Hedge. The products of several foreign funds of funds are also sold in Canada, either directly or through a domestic partner. Except for the National Bank and Desjardins, the major Canadian deposit-taking institutions are still largely absent from this market. In total, about 60 funds of funds are active in Canada.

On the other hand, all the major banks have established prime brokerage services that, in addition to offering execution of trades, provide specialized services to hedge funds, such as financing, custody of securities, transactions settlement, securities lending for short sales, risk-management systems, and even promotional support among investors. Globally, this activity is dominated by three large investment banks.[10] In Canada, the main players to date are the Royal Bank and the Bank of Montreal.

5. A structured note is a negotiable debt security with special features. In this case, interest is replaced by the return on a fund of funds.
6. The advantage for the Crown corporation is a lower borrowing cost.
7. A Canadian insurance company also sells on the retail market a segregated fund linked to a fund of funds.
8. There are fewer managers, since some firms have several funds.
9. Most Canadian hedge funds are based in Toronto, although several Canadian funds of funds are managed from Montréal. Quebec's pension funds are generally more inclined to invest in this type of asset than those of the other provinces.
10. These are: Morgan Stanley, Bear Stearns, and Goldman Sachs.

Box 1

The ABCs of Hedge Funds

The term "hedge fund" covers a very diverse field of organizations and behaviour that defies any simple definition. The analysis in this article is presented from two complementary angles, which are useful to distinguish, since the typical organization called a "hedge fund" is no longer the only one to exhibit these traits. A small, but growing, number of traditional financial institutions, seeking to generate an absolute return, are managing their capital in the manner of hedge funds.

Organization

The typical hedge fund is a private investment pool, limited to a few wealthy or institutional clients,[1] each of whom commits a large amount of money. The organization is usually small and is centred around the expertise of its portfolio managers. These, in turn, are often veterans of traditional money-management firms or former proprietary traders at large banks. Various secondary functions are usually subcontracted to specialized administrators and to prime brokers.

Hedge funds cherish a culture of discretion, even secrecy. Regulation bars them from soliciting business from the general public through advertising. But they seek mainly to protect their market positions, distinctive strategies, and the intellectual property of their quantitative models. The flip side of the coin is that the investor must usually accept a low degree of transparency in the managers' activities and positions.

Legally, these funds are constituted as limited partnerships, are frequently registered offshore, and are subject to light regulation. The general partners invest their own capital alongside that of the limited partners, ensuring the alignment of their financial interests. The general partners receive high management fees, on the order of 1 to 2 per cent of the assets plus 15 to 25 per cent of returns.

Since hedge funds often invest in illiquid markets or positions, the limited partners can withdraw their money only after giving advance notice, once per quarter or per year.

Finally, hedge fund managers have realized that their returns decline when the assets under management exceed a certain threshold relative to the opportunities identified. Possibilities for arbitrage tend to dissipate when too much capital seeks to take advantage of them. Thus, the best-performing funds refuse to accept new investors when approaching what they deem to be the optimal size.

Behaviour

The conduct that includes, but goes beyond, that of hedge funds is described as absolute-return management. The central motivation of hedge funds and related management methods is, indeed, the search for an absolute return. The goal is expressed as a fixed percentage (e.g., 15 per cent) or as a markup on a short-term interest rate.

Traditional management of institutional investments focuses on a relative return—outperforming some market index. This distinction is blurring, since an increasing number of institutional investors now pursue an absolute return.

Hedge funds are sometimes called speculative funds, and some of them clearly are. But in general, seeking an absolute return requires a rigorous and selective management of risk in which it is more important to minimize losses than to maximize returns. In fact, the target return is paired with an acceptable level of volatility. Traditional management, on the other hand, seeks to minimize the negative difference with the index, whether the index is rising or falling.

Absolute-return managers seek out a specific risk, about which they have a strong opinion, and neutralize all other risks arising in the investment. Most of the time, they seek to eliminate market risks (and returns), the beta, and maximize the value added by their talent, the alpha. They usually accomplish this by pairing short positions with long positions. For example, we can imagine two equal positions taken on two pulp and paper companies. This combination will generate neither profit nor loss in response to broad fluctuations in the stock market or in the paper and forest products sub-index. It will, however, generate a profit if there is a change in the relative value of the two companies, provided the one sold short declines relative to the other.

Thus, while traditional managers can make profits only on rising stock prices, absolute-return managers can also earn money on falling prices. Their scope for profitable investments is therefore much broader.

Short positions provide liquidities that can be partially reinvested in long positions. This hedging naturally generates leverage, which may be enhanced by borrowing or using derivatives. The extent of the leverage varies widely according to management strategies and styles. It is estimated at between two and five times, although it can be completely absent.

Note that some funds of funds also use leverage, which increases their returns but also their losses. Given the various sources of leverage, it is difficult for the investor to measure its total magnitude.

It should also be pointed out that the word "hedge" in "hedge funds" can be misleading in some cases, since some of the management styles employed by these funds do not seek to hedge against market risks, but rather to speculate on market direction.

Firms that compile return indexes for the various types of hedge funds have established very elaborate classifications. They categorize funds according to decision processes, instruments used, and geographical markets. Global Macro funds, which opportunistically bet on significant movements in currencies or interest rates, are only one type among many.

In practice, freedom of choice in terms of markets and strategies is constrained by the particular style and specific expertise of the manager, although it is still greater than that of the traditional portfolio manager. Finally, absolute-return management is characterized by returns that are weakly correlated with traditional asset classes, such as stocks and bonds, theoretically allowing the creation of portfolios that are less volatile for a given return. There is also a weak correlation among the returns from various management styles.

1. This includes funds of funds; i.e., organizations that actively manage a portfolio of hedge funds.

The Issues

Some workshop participants expressed disappointment over the fact that relatively few hedge funds have as yet set up shop in Canada. The size of the industry in various countries can be measured in relation to that country's stock exchange. On this scale, despite an annual growth rate of 20 per cent, the industry is only half as developed in Canada as it is in Europe, and only one-sixth of that in the United States. In contrast, the activities of funds of funds and sales of retail products appear to be more developed here.

According to Greenwich Associates (2003), the percentage of Canadian institutional investors in the Canadian hedge fund market is lower than that observed in the other major industrial countries, except the United Kingdom. Thus, the main challenge facing Canadian managers is to raise the necessary capital, especially during the start-up phase. Some attribute this to the fact that there are fewer large foundations and family estates here and that pension funds are smaller and more conservative. Others maintain that reduced access to the required technical expertise and the relative smallness of Canadian financial markets impede the implementation of certain strategies; for example, merger and acquisition arbitrage.

Workshop participants agreed that current regulation is not an obstacle to the development of the industry. After a heated debate, the Securities Exchange Commission recently decided to register hedge fund managers, as is already the case in several countries, including Canada. Here, as elsewhere, the small investor cannot invest directly in hedge funds. However, provincial regulatory bodies allow retail sales visas for a restricted class of closed-end mutual funds and for guaranteed capital products, which, in turn, invest in hedge funds. Moreover, one seminar participant, who lost a large amount of money in a fraudulent U.S. fund, suggested that regulation can deter scam artists. Another, however, maintained that registration generates a false sense of security among investors.

Several international bodies—notably the Financial Stability Forum, the International Monetary Fund, and the Bank for International Settlements—have examined the impact of hedge funds on the stability of the global financial system. Among the issues that are still on their agenda is the management of counterparty risk by the prime brokers of high-leverage hedge funds. The opacity of these high-leverage funds is a further issue, as is the protection of small investors who purchase the industry's retail products. Finally, some emerging-market countries remain concerned about the deleterious effect that the rapid capital inflows and outflows associated with hedge funds may have on the stability of their nascent financial systems.

Nevertheless, some participants emphasized that hedge funds typically buy when traditional investors sell, and vice versa, thus bolstering the liquidity of markets and, consequently, their stability and efficiency. This observation applies particularly to arbitrage strategies, which are based on an expected return to fundamental value, but not to directional strategies, which bet on existing trends.

Conclusion

The Canadian hedge fund industry is growing rapidly in several market niches. However, the marketing side appears somewhat more developed than the production side. This industry does not currently appear to be raising any concerns in matters of financial stability, especially since it is still small. Nonetheless, its activities are largely integrated into the global hedge fund industry. Several international bodies continue to examine the potential benefits and risks associated with that industry.

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Policy and Infrastructure Developments

Introduction

The financial system and all of its various components (institutions, markets, and clearing and settlement systems) are supported by a set of arrangements, including government policies, that influence its structure and facilitate its operation. Taken together, these arrangements form the financial system's infrastructure. Experience has demonstrated that a key determinant of a robust financial system is the extent to which it is underpinned by a solid, well-developed infrastructure. This section of the Review *highlights work in this area, including that related to relevant policy developments.*

In common with central banks around the world, one of the Bank of Canada's functions is to act as a "lender of last resort." In this role, the Bank is the ultimate source of liquid funds to the financial system. This is one way in which the Bank of Canada contributes to the longer-term robustness of the Canadian financial system.

The article *Bank of Canada Lender-of-Last-Resort Policies* sets out the current policies governing these activities, which have recently been reviewed by the Bank. The Bank of Canada has distinct roles as a lender of last resort, and the article outlines how and under what circumstances it can routinely provide liquidity to facilitate payment settlement, as well as the various ways it can respond in more exceptional situations.

Bank of Canada Lender-of-Last-Resort Policies

In common with central banks around the world, one of the functions of the Bank of Canada is to act as a "lender of last resort." The Bank has recently reviewed its policies in this area. This article sets out the policies governing these activities.[1]

The Bank of Canada is the ultimate source of liquid funds to the financial system. As such, it routinely provides liquidity to facilitate payments settlement and responds in various ways to exceptional or emergency situations. The Bank of Canada has three distinct roles as a lender of last resort (LLR).

- The Bank facilitates the settlement of payments systems by routinely extending overnight credit to participants in the Large Value Transfer System (LVTS) through the Standing Liquidity Facility (SLF), to cover temporary end-of-day shortfalls in settlement balances that can arise in the daily settlement of payments.
- For solvent financial institutions requiring more substantial and prolonged credit, the Bank can provide Emergency Lending Assistance (ELA). ELA is intended to overcome a market failure associated with financial institutions that have a significant share of their liabilities as "deposits" (fixed-value promises to pay, redeemable at very short notice) and whose assets are generally highly illiquid.

The Bank of Canada Act requires that such lending be secured by collateral pledged by the borrowing institution. It is the policy of the Bank to lend only to institutions that are judged to be solvent in order to mitigate moral hazard that can arise from such potential intervention, and to avoid damaging the interests of unsecured creditors.

- In conditions of severe and unusual stress on the financial system more generally, the Bank has authority to provide liquidity through outright purchases of a wide variety of securities issued by any Canadian or foreign entities, including non-financial firms.

Standing Liquidity Facility

The purpose of the Standing Liquidity Facility is to support settlement in the payments system by providing collateralized, overnight loans to direct participants in the payments system who are experiencing temporary shortfalls in their settlement balances.[2]

Terms of the SLF

Provision of credit through the SLF is a routine activity, given under the following terms.

- The Bank provides overnight loans at the Bank Rate, an interest rate currently set at 25 basis points above the target overnight rate.
- The Bank is required by the Bank of Canada Act to secure all lending with collateral. The collateral eligible to secure credit from the SLF is the same as that eligible for intraday credit in the Large Value Transfer System.[3]
- Collateral is valued at market value less a discount. Discounts are applied mainly to protect the Bank from market risk (declines in the value of its security caused by changes in

1. The Bank last presented its views on its lender-of-last resort policies in its submission to the Estey Commission in 1986.
2. For a discussion of the LVTS and the Automated Clearing Settlement System (ACSS), see Dingle (1998) and Northcott (2002).
3. Eligible collateral includes securities issued or guaranteed by the Government of Canada, securities issued or guaranteed by a provincial government, Special Deposit Accounts held at the Bank, bankers' acceptances and promissory notes, commercial paper and short-term municipal paper, and corporate and municipal bonds. (The last three categories are subject to minimum credit ratings.)

market conditions), but these "haircuts" also reflect the credit risk of the issuer of the securities. Haircuts are set for broad classes of issuers and are larger for less-creditworthy issuers and for instruments with longer maturities.[4]

Access to Bank of Canada settlement accounts and the SLF

Direct participants in the LVTS are required under Canadian Payments Association (CPA) bylaws to have Bank of Canada settlement accounts and access to the SLF. Since November 2003, the net settlement obligations in the Automated Clearing Settlement System (ACSS) have settled through LVTS payments (on a next-day basis). As a result, all routine credit from the SLF is provided only in connection with the LVTS. (SLF credit would be provided directly for ACSS accounts only in the event of an LVTS outage.)

The Bank, therefore, provides a settlement and loan facility to any institution in the CPA as long as it

- participates directly in the LVTS or the ACSS,
- in the case of ACSS direct clearers, settles all net ACSS positions with LVTS payments credited to its ACSS settlement account at the Bank of Canada, and
- is able to provide the Bank with valid and enforceable first-priority security in collateral of a type that is acceptable to the Bank.

The Bank has additional requirements for access to its lending facility. These are motivated largely by the need for the Bank to have a legally well-founded security interest in the collateral pledged by an institution to support the SLF.

In addition, the various classes of financial institutions eligible for CPA membership, and therefore able to hold settlement accounts at the Bank, are subject to different bankruptcy laws and regulatory regimes.[5] Accordingly, for some classes of institution, the Bank probably would not be able to recover funds from any unsecured portion of a loan. The Bank, therefore, may allow haircuts on collateral that vary for different classes of borrowing institution, or may set different restrictions on the quantities of corporate securities that can be pledged by different classes of institutions.

As a result of these considerations, the Bank requires that an institution wishing to establish settlement and loan arrangements under the SLF

- provides acceptable legal documentation to support the Bank's security interest in pledged collateral, and
- accepts the collateral terms and conditions that may be set by the Bank, which take into account varying exposures to credit risk across different types of institutions.

The required legal documentation includes

- signed Bank of Canada account agreements and loan and security agreements,
- favourable legal opinions regarding the participant's ability to meet the terms and conditions of these agreements, and
- favourable legal opinions from foreign branches regarding the applicability of their home country's laws to these agreements.

In addition, upon application for a settlement facility, the Bank would notify the institution's regulator that the institution intends to open a settlement account. For a federally regulated financial institution, it is expected that such notification would be provided as a matter of course through the Financial Institutions Supervisory Committee (FISC).[6]

4. For a list of the relevant haircuts, see the payments section of the Bank of Canada's website, http://www.bankofcanada.ca/en/payments/rules.htm#collateral.
5. In 2001, eligibility for membership in the CPA was broadened beyond deposit-taking institutions to include life insurance companies, securities dealers that are members of the Investment Dealers Association or the Bourse de Montréal, and money-market mutual funds that meet certain requirements regarding the investment of their holdings and have access to an immediate and reliable source of liquidity.
6. The FISC is the primary interagency committee used to address issues of financial stability in Canada. It was established pursuant to the Office of the Superintendent of Financial Institutions Act for the purpose of facilitating consultations and the exchange of information among its members on all matters relating directly to the supervision of financial institutions. Its membership consists of the Super-intendent of Financial Institutions (who acts as chair), the Deputy Minister of Finance, the Chairperson of the Canadian Deposit Insurance Corporation, the Governor of the Bank of Canada, and the Commissioner of the Financial Consumer Agency of Canada.

Emergency Lending Assistance

While provision of credit through the SLF is a routine activity that facilitates the settlement of the payments system, Emergency Lending Assistance is extraordinary and provides credit to institutions judged to be solvent, but that are, nevertheless, facing serious and persistent liquidity problems.

More specifically, ELA is designed to address a particular kind of market failure associated with a financial institution that issues deposits (fixed-value promises to pay, redeemable at short notice) and that holds a portfolio of non-marketable assets that dominates its operations. A large and sudden increase in the redemption of deposits at such an institution could lead to its insolvency, even though it is otherwise sound, because its assets can be liquidated only with difficulty and are subject to discounts. As a practical matter, whether an institution is subject to this kind of market failure is a matter of judgment, and is increasingly unlikely, given financial developments in Canada, including changes in the regulatory environment.

Terms and conditions of ELA

Under the Bank of Canada Act, the Bank can provide ELA to a member of the CPA for a maximum term to maturity of six months. The loans can be renewed for periods up to six months as many times as the Bank wishes. The minimum rate that the Bank can charge on ELA loans is the Bank Rate. While the Bank has discretion to charge a higher interest rate if it sees fit, in its limited experience with ELA situations, the Bank has charged the Bank Rate.

As noted, the Bank is required under the Bank of Canada Act to secure all lending with collateral. For ELA, the Bank is willing to accept a broader range of collateral than that approved for credit under the SLF. In practice, this would typically mean taking a security interest in an institution's Canadian-dollar non-mortgage loan portfolio to support ELA, and the Bank would lend against this collateral.[7]

Taking such collateral would require that the Bank search security registers for prior security interests in the assets to be pledged, deal with any prior secured creditors, and complete special legal documentation and agreements with the institution—a process that could take two days to a week or more, depending on the complications that arise. This means that advance legal preparation is desirable in probable ELA cases, but this is at the discretion of the relevant financial institution.[8]

Eligibility Criteria for ELA

While the provision of ELA is extremely rare, the risk to the Bank is greater under ELA than under SLF.[9] Under SLF, there is no presumption of a protracted liquidity problem or solvency risk. In contrast, under ELA, there is clearly a significant liquidity problem affecting the institution, and a prima facie reason to question the solvency of the borrower prior to making an ELA loan. As well, under the SLF, only high-quality marketable securities are accepted as collateral, while under ELA, collateral that is subject to greater liquidity and credit risk is likely to be taken.

As a result of the significant inherent risk in ELA situations, the Bank takes more stringent measures with regard to ELA.

- ELA addresses a particular type of market failure (discussed above), and the Bank provides ELA only to classes of institutions that are vulnerable to this type of failure.
- To minimize moral hazard and to avoid impairing the interests of unsecured creditors of the institution, the Bank provides ELA only to institutions judged to be solvent. Therefore, a fundamental and critical consideration is whether the Bank can receive timely and accurate judgments on solvency—this is essential to the Bank's due diligence.
- Since the Bank relies primarily on prudential supervisors for this information, a sound supervisory framework is critical for ELA decisions and ELA management. Such a framework would include a clear supervisory mandate, adequate authority, a program of early intervention, and information-

7. Under the law, mortgages are considered to be a conveyance of "real property," which the Bank cannot take as collateral. In cases where the primary assets available to an institution to secure Bank lending are mortgages, the security interest would have to be structured as an assignment of the mortgage receivables only, and not as an assignment of the mortgages themselves.

8. In such a case, the Bank would register in advance its security in the public, personal property security registry of the institution's home province.

9. The last instance of such lending was in 1986, to the Continental Bank.

sharing protocols with the Bank. It would also provide a means to jointly establish remedial measures and to implement workout strategies. A strong framework mitigates incentives for supervisors to delay dealing with a problem institution; such forbearance could shift risks to the Bank.

- As with lending under SLF, it is important that the Bank have a valid first-priority security interest in any collateral pledged to support ELA.

Implications Regarding Eligibility for ELA

These considerations have the following implications for the eligibility of various classes of institutions for ELA.

- Federally incorporated banks (including foreign bank subsidiaries) and federally incorporated trust and loan corporations would be eligible for ELA.[10] These firms are susceptible to the relevant market failure (referred to above). The Bank can be confident of receiving timely and accurate information regarding the solvency of these institutions. And the federal supervisory regime provides a reliable means to establish remedial measures and to implement workout strategies. In addition, the Canadian Deposit Insurance Corporation can act as a limited provider of liquidity to its member institutions (both federal and provincial) through purchases of assets, and loans or advances (with or without security).
- Insurance companies, mutual funds, and investment dealers would not be eligible for ELA, since they do not issue deposits or hold a significant share of their assets in illiquid, hard-to-value claims.[11]
- Credit union locals and caisses populaires would not generally be eligible for ELA. In most cases, these institutions have access to provincial centrals, the Corporation de Fonds de Sécurité de la Confédération Desjardins (CFSCD), or the Credit Union Central of Canada (CUCC), for liquidity assistance.[12]
- In the case of an extraordinary, widespread event that would have significant, adverse consequences for a provincial credit union/caisse populaire system, the Bank would consider providing ELA through the CUCC, a provincial central, the Caisse centrale Desjardins, or the Fédération des caisses Desjardins, as appropriate, provided that legal arrangements satisfactory to the Bank were established by these entities.[13]
- With regard to foreign bank branches, in a prospective ELA situation, it could be difficult to receive timely and accurate information on solvency from foreign supervisors, and to successfully manage the conflicts in incentives faced by the relevant supervisors when interacting with the Bank in such cases. There can also be legal complications and risks with regard to establishing a security interest for the Bank in some of the assets of these institutions in an ELA situation. Accordingly, foreign bank branches would not normally be eligible for ELA. Nevertheless, in very exceptional circumstances where the home central bank was unable to lend for a day or two (for operational reasons), the Bank of Canada could provide interim lending for a very brief period, typically against collateral that would be eligible for credit through the SLF.

Managing ELA

The management of ELA with respect to financial institutions subject to federal regulation would be in close collaboration with the Financial Institutions Supervisory Committee, which serves

10. In the case of trust companies, the "in-trust" nature of the assets held by such a firm means that ELA could be provided only through a loan secured by company assets, or through an outright purchase of assets, associated with provisions to sell the assets back to the trust company at predetermined prices.
11. However, see the section on "Systemic Risk and Bank of Canada Intervention, p. 54."
12. As well, very few credit union locals or caisses populaires are members of the CPA.
13. Such lending could require the establishment of particular legal mechanisms to allow the Bank to take a security interest in the assets of a credit union or caisse populaire. (See, for example, footnote 7 above.) It could also require a process of rehypothecation of the collateral to the provincial central, the CUCC, or Caisse centrale Desjardins. These arrangements can be complex and costly to set up. The Bank is prepared to work with relevant institutions to prepare the legal groundwork for such arrangements.

as a forum to exchange information relevant for supervision and to coordinate the strategies of its member agencies when dealing with troubled institutions subject to federal regulation.

- The FISC—through the Office of the Superintendent of Financial Institutions (OSFI)—would normally be aware of prospective ELA situations. In this regard, the Bank would keep the FISC informed regarding such possibilities, and vice versa.
- The Bank would notify the FISC immediately in the event that the Bank provided ELA to an institution.
- The Bank would use the FISC as the primary forum for the exchange of information regarding an institution receiving ELA, and the FISC or a relevant subcommittee would meet at least weekly to consider the situation.
- The borrowing institution would be required to provide a business plan to OSFI that outlined remedial measures to rectify its liquidity problems, and to provide increased reporting (data and other information) on its evolving situation.
- Contingency planning would also be conducted at the FISC. Such planning could include possible private sector solutions, as well as alternative work-out arrangements.

While the repayment of SLF loans is routine, terminating ELA is likely to be more complicated. If all goes well, the management of ELA would focus on normalizing the institution's position in the market, or facilitating a merger of the institution, such that ELA could be expeditiously withdrawn.

Following are the main features of the Bank's ELA management procedures.

- The Bank's Financial System Committee[14] would meet immediately and then at least weekly to review any ongoing ELA, formally reconsider the borrowing institution's solvency and the appropriateness of continuing to provide ELA, as well as the limits on lending to the institution.
- If, at any time, the Bank wanted additional information concerning the financial condition of the borrower, the Bank could hire a third-party agent to perform an examination of the institution.
- The ELA loan agreements between the Bank and the borrowing institution would create a one-day, revolving facility in which the Bank would have discretion to decline to make any further one-day loans. This would allow the Bank to readily cease ELA if it judged that the borrowing institution was insolvent, or that the available collateral to support ELA was at a higher risk of being inadequate.
- The Bank would cease ELA when this was judged by the Bank to be appropriate, most notably, when the institution was judged by the Bank to be insolvent, on the basis of information received from OSFI and possibly third-party agents, or when available collateral was inadequate to support further ELA.
- If the Bank became aware of a borrowing institution's insolvency or pending insolvency, it would refrain from taking any new collateral as security for outstanding advances made when the institution was still solvent. At the same time, the FISC would be working to implement an orderly work-out.

Foreign currency ELA

Liquidity support in a foreign currency is an important consideration for Canadian financial institutions, given the significance of foreign currency activities (mainly U.S. dollar) for many of these institutions. However, providing liquidity support in a foreign currency is considerably more difficult than providing Canadian-dollar ELA: while the Bank can create liquidity in Canadian dollars, it cannot do so in foreign currencies.

- Financial institutions are responsible for ensuring that they have reliable arrangements for private sector liquidity support in foreign currencies important to their business.
- Canadian financial institutions should arrange access through foreign central banks to liquidity facilities in those currencies important to their business.
- Provided that the institution qualified for ELA, the Bank could lend Canadian dollars

14. The Financial System Committee comprises the six members of the Bank's Governing Council, the General Counsel/Corporate Secretary, the Regulatory Policy Adviser, and the Chief of the Communications Department.

on a collateralized basis to the illiquid institution which, in turn, could purchase the needed foreign currency in the market with those Canadian dollars.

The Relationship between the SLF and ELA

As noted above, direct participation in the LVTS requires (under CPA bylaws) access to settlement accounts at the Bank of Canada and access to the SLF. The Bank provides loans through the SLF to facilitate the efficient operation of the payments system, provided that the Bank's requirements for SLF (described above) are satisfied.

As discussed, lending under the SLF is routine and low risk: in SLF lending, there are no concerns about the solvency of the borrowing institution; SLF lending is collateralized by high-quality, discounted securities; and, for any given financial institution, SLF lending is transitory (overnight).

In contrast, ELA is, by its very nature, a high-risk undertaking: ELA arises when there are concerns about the solvency of an institution; ELA would probably be secured by collateral that is subject to greater risks; and the potential engagement by the Bank in ELA is indefinite.

It is possible that an institution's borrowing relationship with the Bank might evolve from SLF to ELA under some circumstances. This would have implications for the Bank's management of that lending and for the Bank's relationship with that institution. Accordingly, the Bank monitors the use of the SLF to identify whether a financial institution is using the SLF for ELA-type borrowing. In such a case, the following would apply.

- If the institution were considered to be eligible for ELA, the Bank would initiate internal and FISC-related processes for managing ELA activity, and would require the institution to sign additional ELA legal documentation.
- For other LVTS participants that are not considered to be eligible for ELA, upon identifying ELA-type borrowing, the Bank would indicate to the financial institution that additional borrowing based on a broader range of collateral would not be granted, and the Bank would contact the institution's regulator. The Bank would deny access to additional liquidity once the institution had exhausted its SLF-eligible collateral.

Systemic Risk and Bank of Canada Intervention

Under extreme conditions, the Bank can provide liquidity to any firm. The Bank of Canada Act, paragraph 18 (g.1), gives the Bank the authority, under conditions of "severe or unusual stress on a financial market or financial system" to provide liquidity via outright purchases of a wide variety of claims issued by any Canadian or foreign entities, for the purpose of promoting the stability of the financial system.[15]

In other words, the Bank has the authority to provide liquidity to a broad range of financial and non-financial institutions when the Governor of the Bank judges that such transactions are justified to safeguard the safety and soundness of Canada's financial system. All such transactions would be fully disclosed and justified in the Bank's public statements, including the *Annual Report*. The Bank would also need to publish in the *Canada Gazette* notice that it believes that there is a situation of severe and unusual stress on the financial system.

More specifically, Section 19 of the Bank of Canada Act states that if the Bank takes any action under paragraph 18 (g.1) it must publish a notice in the *Canada Gazette* that "the Governor has formed an opinion that there is a severe and unusual stress on a financial market or financial system." The notice is to be published as soon as the Governor is of the opinion that its publication will not materially contribute to the stress to which the notice relates.

If problems in a financial institution not eligible for ELA under the above policy (but a CPA member) could, in the Bank's judgment, lead to severe or unusual stress on a financial market or financial system, then the Bank may choose to make a liquidity loan instead of making purchases or undertaking repos under paragraph 18 (g.1).

15. This does not include more general liquidity provided through monetary policy actions. The policies explained here are over and above the liquidity provided in response to shocks to the financial system, such as the stock market crash of 1987 or the terrorist attacks of 11 September 2001.

Forced LVTS Loans

A final category of Bank lending can occur in the context of a default in the LVTS. In the event that an LVTS participant defaults, the Bank of Canada could be obliged (under LVTS bylaws) to knowingly lend to an insolvent institution, on the basis of collateral pledged earlier.[16] More specifically, the Bank would be obliged to lend to the defaulting institution on the day of failure against previously pledged collateral to settle that member's obligations to other participants in the LVTS, and so protect against systemic risk.

In the extremely unlikely event of the failure of more than one LVTS participant on the same day during LVTS operating hours, where the sum of the exposures of the failed participants exceeds the value of all the collateral pledged in the system, the Bank of Canada guarantees settlement of the LVTS.[17] In this event, the Bank could be obliged to lend to a failed institution, on a partially unsecured basis, to ensure settlement of the LVTS and so protect against systemic risk.

As noted, the likelihood of this scenario is extremely remote, and the fact that participants pledge collateral sufficient to cover the single largest possible default provides a large element of co-insurance (a deductible) that provides strong incentives for LVTS participants to manage their risks prudently in the system.

16. To secure potential payment obligations, LVTS participants pledge in advance sufficient collateral to cover the largest single possible settlement obligation.
17. The Bank provides such a guarantee to ensure certainty of settlement of the LVTS in all possible circumstances. For more on these points, see Goodlet (1997).

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Research Summaries

Introduction

Bank of Canada staff undertake research designed to improve overall knowledge and understanding of the Canadian and international financial systems. This work is often pursued from a broad, system-wide perspective that emphasizes linkages across the different parts of the financial system (institutions, markets, and clearing and settlement systems). Other linkages of importance may include those between the Canadian financial system and the rest of the economy, as well as those with the international environment, including the international financial system. This section summarizes some of the Bank's recent work.

Within the next several years, the implementation of an updated global bank capital accord (Basel II) developed by the Basel Committee on Banking Supervision will begin. It should strengthen the stability of the global financial system as a whole. One way in which Basel II is designed to achieve this goal is by aligning capital more closely with credit risk in order to ensure that appropriate levels of capital are held by the banking system. But because credit risk is strongly related to the business cycle, some observers have wondered whether the new rules would exacerbate cyclicality in the banking industry and, in particular, the behaviour of bank capital and lending. In *Basel II and Required Bank Capital*, the potential for cyclicality in bank capital requirements is explored by applying Basel II rules to Canadian bank data on corporate and sovereign exposures under various scenarios. One finding is that required capital for corporate exposures could be more volatile than under Basel I, in particular, the greater the use of market-based measures of credit risk relative to "through-the-cycle" measures.

Models of information asymmetry suggest that if investors believe that insiders systematically trade corporate shares on material, non-public information, this will ultimately raise the cost of capital for firms. In *Pre-Bid Run-Ups Ahead of Canadian Takeovers: How Big Is the Problem?* Bank of Canada staff investigate whether there is evidence of illegal insider trading in Canada ahead of a specific type of corporate event; namely, a takeover bid. This line of research addresses an important dimension of capital market efficiency—the degree of information asymmetry among market participants.

What drives the common variation in the movements of international stock markets? Knowledge of how asset prices in an open economy like Canada's are affected by foreign information is of direct importance to understanding how the Bank of Canada could reduce the likelihood that problems in another financial system would trigger instability in Canada. In particular, an assessment of the stability of financial markets requires an understanding of how and what information is incorporated into asset prices. The article *Monetary Policy, Private Information, and International Stock Markets* summarizes a paper in which researchers assess whether sophisticated investors possessing superior (private) information about future U.S. interest rates and stock market movements affect international stock market comovements.

Basel II and Required Bank Capital

*Mark Illing and Graydon Paulin**

Within the next several years, implementation of an updated global bank capital accord (Basel II) will begin in a number of countries. The new framework is designed to align bank capital more closely with risk, thereby ensuring that appropriate levels of capital are held by the banking system. In particular, capital requirements for credit risk will be modified along the lines of how the most sophisticated banks currently calculate economic capital for their loan books. Since credit risk is strongly related to the business cycle, however, it is useful to examine the degree to which required bank capital is likely to be cyclical.

Basel II is composed of three "pillars." The first is an enhanced set of rules for calculating minimum capital requirements, embodying advances in risk measurement since the first capital accord (Basel I). The second pillar addresses the supervisory review of bank capital adequacy, while the third addresses disclosure rules to facilitate the public assessment of banks.[1] The three pillars together will determine the actual level of capital held by banks, but this article focuses on the minimum capital requirements arising from the first pillar.

The central objective of Basel II's first pillar is to increase the sensitivity of bank capital to the risks associated with specific classes of financial assets (particularly credit risk). To this end, Basel II offers banks two potential approaches for calculating required capital: the Standard approach and the Internal Ratings Based (IRB) approach. The latter is divided into the Foundation and Advanced approaches. The major Canadian banks, provided they meet regulatory requirements, are most likely to adopt the Advanced IRB approach.

With respect to credit risk, a key aspect of Basel II's Advanced IRB approach is its use of a credit value-at-risk model (VaR)[2] to determine minimum levels of regulatory bank capital and loss provisions.[3] Banks that meet rigorous standards will be allowed to use their own parameter estimates in this model.

If the credit risk faced by a bank is cyclical, it is conceivable that the output of this VaR will yield cyclical minimum capital requirements. Credit risk in Canada does indeed contain a strong cyclical component. Together with the observation that over 90 per cent of the credit losses of Canadian banks in the past two decades have occurred on their corporate and sovereign exposures,[4] this raises the issue of how Basel II might affect the cyclicality of required bank capital held against their corporate and sovereign portfolios.

To address this question, we applied Basel II rules to two decades of Canadian bank data on corporate and sovereign exposures and examined the results under various scenarios.[5] An

1. A full description of the pillars can be found in BIS (2004).
2. A value-at-risk model generates a statistical distribution of the potential loss associated with holding a specific financial portfolio over a given period (one year in the case of Basel II).
* This is a summary of a recently published working paper (Illing and Paulin 2004).
3. Bank capital will continue to be defined according to the rules outlined in Basel I and its subsequent revisions. Loss provisions, alternatively known as reserves, are an amount set aside by banks to cover anticipated losses on assets, potential litigation costs, and other costs not usually defined as operating expenses.
4. Exposures include loans, securities, and other claims. The corporate sector includes interbank exposures. Corporate and sovereign exposures currently represent approximately 28 per cent and 7 per cent of overall assets in the Canadian banking system, respectively.
5. Other types of bank exposures were not examined (e.g., residential mortgages or asset-backed commercial paper), since in aggregate they do not generate significant losses, and are thus expected to have relatively stable capital requirements.

important caveat is that these simulations cannot capture behavioural responses that might be induced by the new rules. In addition, we had to estimate a significant amount of the data—most critically, the credit-quality distribution of corporate exposures. Therefore, we report results for a range of scenarios that cover different portfolio distributions and assumptions. These scenarios provide a sense of how significant the behavioural responses might be and how sensitive the Basel II requirements are to various assumptions. Finally, our base-case simulations use what we consider to be the most plausible and realistic assumptions for the Canadian banking system.

The simulations use detailed data on actual banking system exposures to corporations (by industry) and to sovereigns (by country). However, since the precise credit-quality distribution of the corporate exposures is unknown, we provide results for high-, medium-, and low-quality portfolios (indicated by their median credit ratings). The distribution for sovereign exposures is known precisely, so estimation is not necessary.

We use two methods to track the evolution of the corporate distributions over the period 1984–2003. First, we use credit-rating-transition matrices based on the actual evolution of Canadian corporate credit ratings (from ratings agencies) over this period. Credit ratings provide relatively stable estimates of credit risk but are typically slow to respond to a rapid change in credit quality. Second, we track the change in credit quality with credit spreads on corporate bonds. These spreads tend to respond quickly to changes in credit quality but are more volatile than credit ratings.

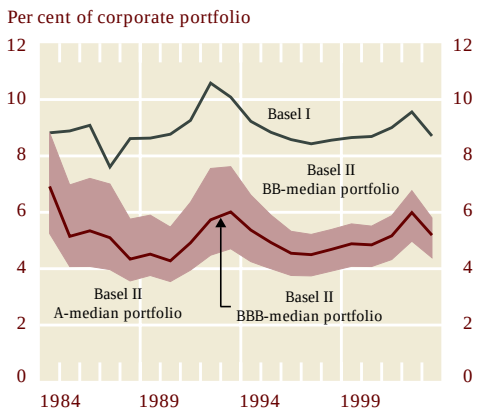
Both methods are based on data that pertain to only large Canadian corporations.[6] However, these two methods are simplified characterizations of common techniques that banks use to measure credit risk. These assumptions and data are fed into Basel II's Advanced IRB model to generate our simulated results.

Note that the Basel II model distinguishes between expected (average) loss and unexpected (upper-bound) loss. Banks must make provisions against expected loss (or hold capital against the shortfall), and they must hold capital against unexpected loss. We present results

6. Thus, we assume that the credit-quality distribution of small corporations is the same as that of large corporations.

Chart 1 Requirements for the Corporate Exposures of Canadian Banks

Basel I versus simulated Basel II (credit ratings)



Basel I ratio includes capital plus general and specific provisions.
Basel II ratio includes minimum required capital for unexpected loss, required specific provisions for expected loss, and a charge for operational risk.
Source: Authors' calculations based on BIS (2002).

Table 1

Volatility of Basel II Requirements

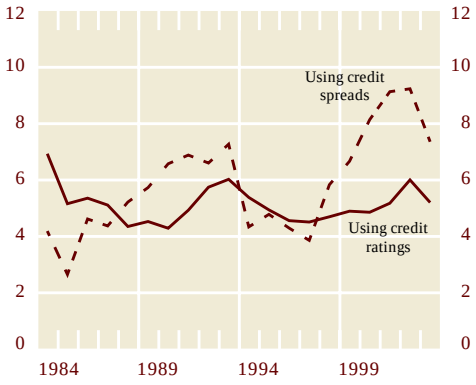
For the Canadian Banking System, 1984–2003

	Portfolio quality	Standard deviation in percentage points		
		Basel I including provisions	Basel II using credit ratings	Basel II using credit spreads
Corporate exposures of Canadian banks	A-median	0.39	0.44	1.49
	BBB-median	0.60	0.65	1.80
	BB-median	0.86	0.96	2.71
Memorandum item: Observed standard deviation of Canadian banks' total actual eligible capital plus allowances for losses was 0.90.				

Note: The comparison is based on Basel I capital requirements plus actual provisions. Basel I requirements are estimated prior to 1988. Basel II requirements include capital for unexpected loss, provisions for expected loss, and an operational charge as per BIS (2002).

Chart 2 Alternative Simulated Basel II Requirements for Corporate Exposures of Canadian Banks

Per cent of corporate portfolio

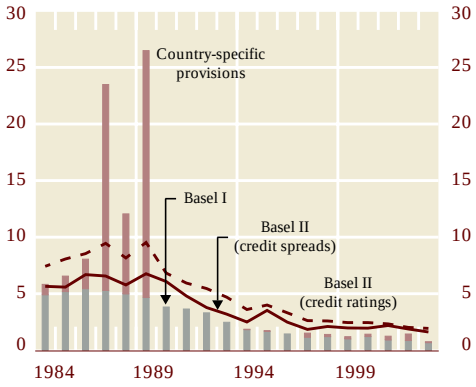


Both ratios include minimum required capital for unexpected loss, required specific provisions for expected loss, and a charge for operational risk. A median portfolio rating of BBB+ and an LGD of 45 per cent are assumed.
Source: Authors' calculations based on BIS (2002)

Chart 3 Requirements for the Sovereign Exposures of Canadian Banks

Basel I versus simulated Basel II

Per cent of exposures



The Basel II ratio includes minimum required capital for unexpected loss, required specific provisions for expected loss, and a charge for operational risk.
Sources: Moody's (2004), S&P (2004), and authors' calculations based on BIS (2002)

for the total requirements (minimum required capital and provisions combined). Although the tax implications vary between the two, both affect earnings. Canadian banks raise most new capital through retained earnings, while provisions are a deduction from earnings.

Corporate Exposures

When credit ratings are used to measure corporate credit risk, the simulated minimum capital and provisions for corporate exposures required under Basel II over the period 1984–2003 fell by about one-third relative to the equivalent Basel I measure (Chart 1).[7] And there was only a modest increase in the volatility of requirements (Table 1, middle column).[8]

In contrast, when yield spreads on bonds are used to measure credit risk, simulated minimum requirements for corporate exposures were clearly more volatile under Basel II than under Basel I (Table 1, last column). For example, using this measure, required capital and provisions for a BBB-median-rated corporate portfolio doubled between 1997 and 2002 (Chart 2), a period where there was substantial cyclical deterioration in credit quality.

Sovereign Exposures

Next, we measured sovereign credit risk with both country-specific credit ratings and yield spreads on sovereign bonds. In both cases, the simulated Basel II capital and provisions for sovereign exposures were about two times higher than the capital requirements under Basel I (Chart 3). However, during the late 1980s several Canadian banks made large country-specific provisions for the debts of less-developed countries (LDC), most of which occurred before the Basel I rules actually took effect.[9] If we add

7. We compare Basel II total requirements to Basel I capital requirements plus actual provisions adjusted for the credit-quality distribution of the portfolio.
8. Although the decline in capital sounds dramatic, the results are consistent with those obtained elsewhere. See, for example, Kiesel, Perraudin, and Taylor (2003) and French (2004) for U.S. banks.
9. In addition to the implementation of Basel I in 1988, the supervisory regime in Canada was being reorganized, and the large provisions partly reflected the recognition of losses that had, in fact, occurred earlier in the decade during the previous supervisory regime.

these provisions to the Basel I ratio (the red bar in Chart 3), then the Basel II requirements appear to be less volatile. This is because Basel II rules require banks to either provision against or capitalize probable losses as *they are identified*.

Conclusions

Our simulations illustrate the change in minimum required bank capital in response to historical changes in the level and credit distribution of bank assets. By definition, however, they do not capture the behavioural changes that would be induced by the different incentives under Basel II. To some extent, however, the different scenarios provide an indication of the potential behavioural impact.

We find that minimum required capital for corporate exposures could be more volatile than under Basel I. The increase in volatility is greater the lower the quality of the portfolio and the greater the use of market-based measures of credit risk (such as yield spreads) relative to "through-the-cycle" measures (such as credit ratings). In contrast, we find that for sovereign exposures the new rules could produce higher, but less volatile, minimum capital requirements.

If the increased risk sensitivity in Basel II contributes to changes in overall required capital that are unacceptable to the banks, they may try to mitigate this effect by adjusting their lending (reducing it during periods of deteriorating credit quality) or by adjusting the quality distribution of their portfolios (shifting towards higher-quality assets). Thus, the actual observed volatility in capital may not change significantly once Basel II is implemented, but perhaps only because banks are adjusting their loan portfolios accordingly. This is precisely the cyclical behaviour that has raised some concern.

Several factors may mitigate the potential impact of Basel II on the cyclical behaviour of capital, however. Cyclicality is already present in the banking system. Indeed, the volatility of actual bank capital over the 1984–2003 period was already comparatively high relative to our base-case scenario and most of the alternatives examined, suggesting that non-regulatory phenomena are also important factors influencing volatility in bank capital.

Our analysis shows that an important consideration is precisely how banks choose to calculate their capital requirements, which will also be influenced by accounting and tax regimes that vary across countries. Our expectation is that they would tend towards smoother measures of credit risk (such as credit ratings), although these effectively reduce the short-term sensitivity to changes in risk. Canadian banks are also well capitalized, and they may use this high level of capital to create an effective buffer to absorb volatility in required capital.

Eligible banks might be expected to opt for the IRB approach if it provides them with potential efficiency gains (i.e., owing to lower required levels of capital than under the Standard approach). As suggested above, to offset the increased volatility of minimum capital requirements that arises from the IRB rules, banks may tend to maintain buffer stocks of capital, in which case, there may be little induced cyclicality in lending via this channel. They may follow this strategy if the resulting level of capital, including the buffer, would be lower than under Basel I.

The analysis in this article focused on the implications of Basel II's first pillar, and implies that banks need to carefully assess which method they will use to calculate required capital in the IRB approach, as well as the implications for the desired level of buffer capital. In practice, the level of capital actually held by banks will also be influenced by Basel II's second and third pillars. This analysis emphasized the banking system's corporate and sovereign portfolios, which make up about 35 per cent of total bank assets and which have the greatest potential for cyclicality in capital requirements. One would expect the results to be less pronounced for the banking system as a whole, because the capital requirements for the remaining 65 per cent of bank assets are expected to be relatively stable.

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Pre-Bid Run-Ups Ahead of Canadian Takeovers: How Big Is the Problem?

*Michael R. King and Maksym Padalko**

This study addresses an important dimension of capital market efficiency; namely, the degree of information asymmetry among market participants (Bauer 2004). Insider trading is defined as trading by managers and board members in the stock of their own firms. Regulators in many countries have adopted securities laws restricting when and how these corporate insiders may trade in these shares. These laws make it illegal for insiders to trade while in possession of material, non-public information, or to share this information selectively with other investors. Instead, companies are required to disclose material information through a press release so that all investors have an equal opportunity to trade on this information. Despite arguments that suggest illegal insider trading is a victimless crime that promotes market efficiency and provides an efficient means of compensating managers, regulators have taken the view that it is harmful to public welfare (Bainbridge 2000). Models of information asymmetry suggest that if investors believe that insiders systematically trade on material, non-public information, this will increase the rate of return demanded by less-informed investors, widen the bid-ask spreads set by market makers, and reduce liquidity in secondary markets. These effects would raise the cost of capital for firms and ultimately hurt public welfare by reducing economic growth.

Scope

This paper investigates whether there is evidence of illegal insider trading in Canada ahead of a specific type of corporate event; namely, a takeover bid. We examine 420 takeover bids of publicly listed Canadian firms from 1985 to 2002. We determine whether there are any systematic price and volume increases in the target firm's shares ahead of the first public announcement (a pre-bid run-up). We document the pattern of these pre-bid run-ups and compare them with the results from similar studies of U.S. takeovers. We propose a test to differentiate between competing explanations of run-ups based on the coincidence of abnormal price movements and abnormal volume, and the timing of the pre-bid run-up in relation to the first public announcement.

Methodology

Pre-bid run-ups ahead of a takeover announcement may be caused by information leakage as a result of insider trading, market anticipation by investors who correctly identify a potential takeover target prior to the announcement, or some combination of both. We begin with the assumption that capital markets exhibit informational efficiency; namely, that stock prices incorporate all public and private information about a firm. As our null hypothesis, we propose that pre-bid price run-ups reflect the market's anticipation of a takeover announcement. Investors anticipate that a given firm will be subject to a takeover based on rumours in the press, an analysis of industry trends, or factors specific to a company, such as financial distress. This market anticipation—whether accurate or not—becomes incorporated into prices through trades, leading to a run-up ahead of the first public announcement.

The alternative hypothesis is that pre-bid run-ups are caused by information leakage associated with insider trading. In this scenario, the increase in the stock price ahead of the announcement of a takeover bid is caused by insiders who are trading illegally to profit from the price jump

* This article summarizes a forthcoming Bank of Canada working paper.

when the takeover is announced. Studies of actual cases of illegal insider trading support this view. These studies document that illegal insider trades are accompanied by both abnormal price movements and abnormal trading volume in a stock (Cornell and Sirri 1992; Meulbroek 1992). Illegal insider trading typically takes place far ahead of the announcement, since insiders seek to avoid the period shortly before the announcement when regulatory scrutiny is highest. We use these stylized facts to identify illegal insider trading, consistent with the detection algorithms used by regulators when reviewing trading patterns after major corporate events. This approach cannot be used to prove illegal insider trading, but it can be used to detect its presence or to suggest its absence. The key point to note is that abnormal price movements that are not accompanied by abnormal volume changes (or vice versa) would constitute a rejection of this alternative hypothesis. Likewise, abnormal price movements or volumes that occur shortly before the announcement are more likely to be caused by market anticipation.

We conduct a standard event study to examine abnormal price movements and trading volumes (MacKinlay 1997). This approach involves choosing an event—such as a takeover announcement—and looking at the behaviour of the stock before and after the event. The aim is to determine how the event affected the stock by comparing actual movements in stock prices with changes that might have been expected if the event had not taken place. For each takeover in our sample, we set the date of the announcement as day 0, and we calculate daily abnormal price movements over the prior three months. We then calculate the average abnormal price movements across the 420 transactions for each day in our event window, and we accumulate these daily abnormal price movements over some time horizon. Given that we expect no abnormal price movements in the absence of a takeover announcement, we test to see whether these average and cumulative abnormal price movements are statistically different from zero using both a standard parametric z-test and a non-parametric, signed-rank test. We conduct a similar analysis of trading volume using average abnormal volume and cumulative average abnormal volume for each of the 420 takeover announcements.

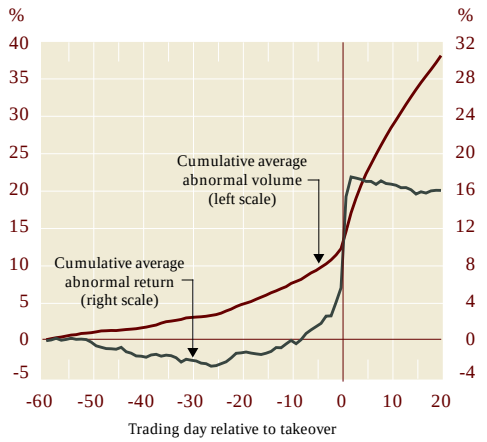
Summary of Findings

We find that both average and cumulative abnormal price movements become positive and statistically significant only shortly before the first public announcement (Chart 1). Across our sample, the average abnormal price movement on day 0 is 9.8 per cent, which captures the increase in the stock price on the day when the takeover is announced. The magnitude and timing of pre-bid run-ups for the Canadian sample are very similar in magnitude to run-ups documented for U.S. takeovers, suggesting that stock prices react in the same manner in both countries.

We divide our sample into various sub-samples to investigate the impact on the run-ups of industry membership and the time period when the takeover bid occurred. Previous studies suggest that a clustering of takeovers in one sector or during one time period increases the ability of the market to anticipate future potential takeovers. Our sample exhibits a high number of takeovers in the natural resource sector, and a clustering of bids over a few key years. We hypothesize that the cumulative abnormal price movements for takeovers of natural resource firms should be higher than for non-resource firms that are more heterogeneous. Contrary to our expectations, the run-up for natural resource firms is almost half the comparable run-up for non-resource firms. Additional analysis is needed to explain this result.

We also consider the impact of institutional changes on pre-bid run-ups. If illegal insider trading is the source of pre-bid run-ups, increased supervision and enforcement, as well as advances in technology should discourage this behaviour by making it easier to detect ex post. The resources devoted to monitoring and enforcement increased significantly in 1998, after the Ontario Securities Commission became self-funded. At the same time, the TSX closed its trading floor and moved all stocks to an electronic trading system. Both changes lead us to expect that pre-bid run-ups may be smaller post-1997 than during the earlier period. Instead, we find that both the pre-bid run-ups and the price jump over the event window were larger for takeovers announced after 1997. This finding, together with the finding that more media rumours are observed over this period, suggests that market anticipation has increased,

Chart 1 Cumulative Abnormal Return and Volume for 420 Takeovers, 1985 to 2002



possibly because of improvements in market transparency. This hypothesis will be tested in future research.

To test whether pre-bid price run-ups are explained by information leakage or market anticipation, we examine whether abnormal price movements during the pre-event window are accompanied by abnormal trading volumes. A naïve comparison of the abnormal price movements during the pre-event window with the abnormal volumes on the same day suggests that there are almost no cases, on average, when both were observed on the same day (Chart 1). A more formal test of the relationship is provided by running panel regressions of abnormal volumes on abnormal price movements. Abnormal price movements are statistically associated with abnormal volumes at the 99 per cent level, although the small size of the coefficient suggests that the relationship is not economically important. From these panel regressions, we conclude that abnormal price movements during our pre-event window are not importantly associated with abnormal volumes. We fail to reject the null hypothesis, and conclude that pre-bid run-ups are caused by market anticipation, not by information leakage as a result of illegal insider trading.

Conclusion

We find evidence of pre-bid run-ups in a sample of 420 Canadian takeovers, consistent with similar studies of U.S. takeovers. In our study, pre-bid run-ups occurred shortly before the first public announcement and were of comparable magnitude to the run-ups ahead of U.S. takeovers. The size of price run-ups increased in our sample for deals announced after 1997, during a period when regulators devoted greater resources to the monitoring of markets and the enforcement of insider-trading regulations. Contrary to our expectations, run-ups were lower for firms in the natural resource sector, despite the clustering of deals in this sector.

Based on the pattern of run-ups, the absence of abnormal trading volumes on days with abnormal price movements, and the timing of the run-up shortly before the announcement date, we conclude that pre-bid run-ups are consistent with market anticipation and reject an explanation based on information leakage from illegal insider trading. This study suggests that Canadian

equity markets are efficient, and does not support the view that Canada has a greater problem with insider trading than the United States.

While this conclusion applies to the average takeover announcement in our sample of 420, we cannot dismiss the possibility of illegal insider trading in any of the individual takeovers in our sample. Likewise, this article has not examined insider trading ahead of other important corporate events, such as earnings announcements, dividend changes, and bankruptcy announcements. We leave these topics to future research.

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Monetary Policy, Private Information, and International Stock Markets

*by Gregory H. Bauer and Clara Vega**

Financial economists are uncertain as to the cause of common movements in international stock markets. Previous studies have found that only a small fraction of the movements can be attributed to public news about macroeconomic variables. This has led some to suggest that investor irrationality is responsible. In this article, we assess whether investors possessing superior (private) information about future U.S. interest rates and stock market movements affect international stock market comovements.

What drives the common variations in international stock market movements? This is an important question for a number of reasons. First, researchers have identified a large degree of risk reduction in equity portfolios from diversifying funds into international stocks. The more that stock markets around the world move together, the smaller are the gains from diversification. Second, it is important to know whether the comovements are driven by rational responses to new information or by the over-reaction of one market to movements in another. Third, it is important for the Bank of Canada to understand how asset prices in a small, open economy are affected by foreign information. In particular, an assessment of the behaviour of financial markets requires an understanding of how and what information is incorporated into prices. Finally, it is important for central bankers to know how much of the movement is caused by changes in monetary policy. This will, in turn, help explain how the cost of capital for domestic corporations is determined in global markets.

Background

Financial research provides a compelling answer to this question. Asset-pricing models show that expected stock returns vary in response to changes in risk-free interest rates, changes in expected future cash flows, and/or changes in the equity risk premium.[1] In a rational asset-pricing framework, with integrated international stock markets, comovements in international stock returns would be driven by news about macroeconomic variables that affect cash flows, risk-free rates, or risk premiums in many countries.[2]

But existing studies, using daily or monthly data, show that public news about macroeconomic variables has a limited impact on international equity returns. For example, King, Sentana, and Wadhwani (1994) construct a factor model of monthly returns in 16 national stock markets and examine the influence of 10 key macroeconomic variables.[3] They conclude that the public news components of these observable variables contribute little to variations in world stock markets. Rather, there is a dominant unobservable (i.e., non-public) factor driving international returns. They interpret the common factor as an index of "investor sentiment," suggesting a degree of market irrationality. Other studies also find that public news about macroeconomic variables has little cross-market impact; e.g., Karolyi and Stulz (1996), Connolly and Wang (2003).

If public news about macroeconomic variables is not responsible for the comovements, could some "market friction" be responsible? One potential friction is asymmetric information. Information is asymmetric when some investors have superior (private) information about the

1. The equity risk premium is the extra return required on (risky) stocks above the return required on (less risky) bonds.

* This article summarizes a recently published Bank of Canada working paper (Bauer and Vega 2004).

2. In a "rational" market, prices fully and accurately reflect all available information. Markets are "integrated" when there are no barriers to trade in financial assets between countries.

3. In a factor model, the expected returns on a large number of stocks are explained by a much smaller number of variables.

returns on assets in their own country. The standard view is that these "sophisticated" agents are either insiders in a company or obtain the private information about the firm by analyzing public information in a superior manner. When sophisticated agents trade, their private information is (partially) revealed to the market, causing revisions in asset prices. Trading based on private information could thus be a potential cause of the comovements in international stock returns if the agents had superior knowledge about the common macroeconomic factors that price equities in many countries. But the economic origins of such private information remain unexplored. Indeed, Goodhart and O'Hara (1997) wonder, "in the international context, how could private information be expected to have a global impact?"

One possible answer to this question is that sophisticated investors could have superior information about future macroeconomic factors that will affect both U.S. equity prices and interest rates. This private information about U.S. macroeconomic factors would likely be useful in making trades in stocks around the world. The large size of the U.S. economy and the links between U.S. and foreign firms suggest that U.S. macroeconomic conditions are likely to have a global impact. Indeed, if international equity markets are integrated, then private information about U.S. factors will give informed agents superior knowledge about the global factors that price stocks in many countries (Albuquerque, Bauer, and Schneider 2003). Thus, it is likely that the private information of sophisticated investors trading in (liquid) U.S. markets will help explain the cross-section of international equity returns.[4] This article therefore addresses the question of whether both public and private news about U.S. macroeconomic factors could help explain comovements in international stock markets.

Methodology

In our paper, we test the potential cross-market effect of trading on private information by looking at information revealed in two U.S. markets.

4. Another source of such global private information is the trading floors of large banks. Traders see customer order flows in many markets around the world. This superior knowledge of global demand conditions would be useful for the firm's proprietary traders.

The first is the Eurodollar futures market that trades on the Chicago Mercantile Exchange. The Eurodollar futures contract is considered to be the most liquid exchange-traded money-market instrument in the world. Traders use the market to hedge against, and speculate on, future movements in the Eurodollar interest rate (the rate on U.S.-dollar deposits in banks outside the United States). We look at holding-period returns on and trades in the six-month Eurodollar futures contract.

The second market is the S&P 500 Exchange Traded Fund (ETF), known by its acronym as the SPDR (Spider), which began trading on the AMEX in 1993.[5] This fund is designed to track the performance of the S&P 500 Index, a broad index of U.S. stocks. The SPDR is a very liquid security; in mid-2003, the fund had over US$37 billion in assets under management, with an average daily trading volume totalling US$4 billion.

We examine the impact on foreign stock markets of public and private news originating in these two U.S. markets. We wish to observe the prices of foreign stocks at the same time that we observe prices in the two U.S. markets. To do this, we use foreign ETFs. Barclays Global Fund Advisors manage "iShares" that trade on the AMEX. They are baskets of foreign stocks put together to track the performance of foreign market indexes compiled by Morgan Stanley Capital International. We also use the ETFs of 12 other countries (Germany, Japan, the United Kingdom, Switzerland, Canada, France, Netherlands, Hong Kong, Spain, Sweden, Australia, and Italy). These countries were selected because they have developed equity markets and ETF data that are available over the sample period.

5. ETFs are shares of a portfolio of stocks that trade continuously on an exchange and are designed to closely track the performance of a specific index. Managers of ETFs may buy either all the stocks in the index or a sample of stocks to track the index. Market participants are able to create and redeem shares in an ETF when its market price differs from the value of its underlying index. This ability to "open" the funds at any time ensures that ETFs trade near their net asset value. Elton et al. (2002) conclude that the SPDR closely tracks the S&P 500 Index, since the difference between the two is less than 1.8 basis points per annum.

Our analysis proceeds in two steps. In the first, we obtain public and private information shocks in the two U.S. markets by adapting techniques from the microstructure literature (primarily Hasbrouck 1991). Our analysis relies on the use of high-frequency data to obtain better estimates of the impact of news on prices. We use regression analysis to remove the impact of short-run microstructure effects from the high-frequency price and trade data. The residuals from these regressions represent (noisy measures of) public and private information shocks occurring in U.S. markets.

In the second step, we use a factor model of international equity returns to evaluate the effects of the U.S. public and private information shocks on foreign equity markets.[6] We examine how well these factors are able to explain comovements in international stock markets over holding periods ranging from one-half hour out to one week.[7] The effects of private information will be revealed if unanticipated trades in U.S. markets are significant for longer holding periods (one day to one week). This is because unanticipated trades are a combination of random liquidity shocks plus private information. Liquidity shocks have only a short-run effect on prices, while the effect of private information is permanent.

Results

The analysis yields a number of interesting findings. The first stage of the analysis reveals that some agents have superior knowledge about future U.S. interest rates and aggregate equity market returns. This suggests that the old way of viewing private information as a "firm-specific" phenomenon is not correct; sophisticated investors can have private information about entire markets. This comes from their superior interpretation of public news.

In the second stage of the analysis, there is strong evidence of information spillover across markets. Both private and public information shocks revealed in U.S. markets are components of the factors that model the cross-section of international equity returns. Contrary to the earlier literature, public information shocks do have an effect, because they are more precisely measured in the microstructure data than they were in the daily or monthly data. Private information shocks are also a statistically significant part of the factor. Sophisticated investors have an impact on global markets when their superior information is incorporated into international equity returns. This trading based on private information is partly responsible for the common variation in the movements of international stock markets.

An interesting finding concerning monetary policy is that unanticipated interest rate changes made by the U.S. Federal Reserve Board influence foreign stock markets. A policy-driven increase in U.S. interest rates lowers foreign stock returns. Changes in U.S. interest rates that are not associated with monetary policy are not statistically significant. Thus, changes in U.S. interest rates affect the international cost of equity capital only when they are associated with changes in monetary policy.

These shocks are quantitatively important. For example, a shock of one standard deviation to private information about future U.S. interest rates is equivalent to almost 25 per cent of the standard deviation of the total factor driving weekly returns. A similar shock to private information about U.S. equity markets is equivalent to 17 per cent of the standard deviation of the factor.

Private information can originate in two ways. Sophisticated agents, such as hedge fund managers, can conduct "top-down" analyses, where they generate private information about macroeconomic fundamentals from a superior interpretation of public information.[8] The fundamentals could be related to either the U.S. economy or foreign economies. In either case, with integrated international markets, such information would be useful for capturing return variations in many countries.

Alternatively, order flow in U.S. markets could be acting as a "bottom-up" aggregator of diffuse

6. The factors are linear combinations of the public and private information shocks from U.S. money and equity markets.
7. Foreign stocks will also respond to news released in their home markets. Thus, the approach does not measure the effects on asset prices of all trades based on private information, but only a subset of these trades.
8. A "top-down" fund manager is an individual who has a well-developed view of the macroeconomy and uses this view to invest in many different sectors.

private information. Evans and Lyons (2004) present a model of the foreign exchange market where order flow aggregates the dispersed private information about productivity shocks in two countries. They note that while productivity shocks would occur at the level of the firm, aggregate trades by agents in the country would give a more precise estimate of the country's productivity shock for that period. They also note that agents' trades could be aggregating information about other variables at the micro level, such as money demand. Our U.S. shocks can be interpreted as money-demand shocks and real shocks arising from firm-level information. Financial firms in the United States that observe a large cross-section of customer order flows could extract such information and use it for proprietary trading. Again, with integrated markets, such U.S. information shocks would have an international effect.

Conclusion

The goal of this research is to deepen our understanding of the links between movements in the prices of foreign assets and news (public and private) originating in U.S. money and equity markets. Our first contribution is to show that some agents have private information about future U.S. interest rates and about aggregate returns in equity markets. Our second contribution is to show that this superior knowledge affects equity markets abroad. This finding gets to the core of Goodhart and O'Hara's (1997) question of how private information can have a global impact. Not only do we show that public and private information about U.S. interest rates and aggregate equity markets predicts future movements in foreign equity markets, but we also show that these are components of factors that are priced in the cross-section of international equities.

The analysis raises a number of additional questions. Are other sources of private information available to sophisticated investors? While monetary shocks are important, there may be "real" shocks related to technology or productivity that sophisticated investors observe. In addition, who are the investors who obtain this information? Is it solely American investors who have superior knowledge about American markets? It is likely that sophisticated foreign investors—such as offshore hedge funds—could also obtain this information. Finally, does this private information affect other assets, such as foreign exchange and fixed-income markets? Answering all these questions requires further analysis.

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