

# Regulatory Constraints on Leverage: The Canadian Experience

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The Basel capital framework plays an important role in risk management by linking a bank's minimum capital requirements to the riskiness of its asset portfolio. Nevertheless, owing to model and data limitations, these calculations may not fully capture the actual level of risk. For example, as economic conditions improve during the upswing of a cycle, there may be a tendency for risk assessments to be overly optimistic. The opposite tendency may occur during a downturn. As a result, risk-adjusted capital ratios may not fully reflect risk exposures and future vulnerabilities in the financial system. Vulnerabilities can be worsened when changes in risk assessments from optimistic to pessimistic create a need to raise additional capital under stressful conditions.

Internationally, one reaction to these concerns has been to consider ways to improve the methods used to quantify risks. Another strategy is to supplement the information in risk-weighted measures of capital adequacy with other indicators such as an unweighted leverage ratio (defined as an assets-to-capital multiple). Although a simple leverage ratio has its own limitations, it may serve a useful complementary role since it is not distorted by the potential biases in risk-adjusted measures.<sup>1</sup>

As part of Canada's capital-adequacy regime, banks and other federally regulated deposit-taking institutions have been subject to a regulatory ceiling on the unweighted leverage ratio since the early 1980s. This leverage requirement was retained even after implementation of the risk-adjusted measures under Basel I and Basel II. Because measures of risk are imperfect, the Canadian regulator (OSFI) believes that the leverage ratio can function as an objective measure to complement the risk-weighted Basel

capital requirements (Dickson 2009). Moreover, a leverage constraint helps to prevent banks from expanding their balance sheets excessively by accumulating assets with low Basel risk weights.<sup>2</sup> These pressures could be greatest during the boom phase of a cycle. Thus, a leverage requirement may be a useful tool for moderating procyclical forces in the financial system.

The imposition of regulatory leverage ceilings has recently been identified by international committees as one of many potential policy options to mitigate procyclicality and strengthen the resiliency of the global financial system. Currently, few countries have formal leverage constraints. In addition to Canada, U.S. commercial banks have been subject to leverage requirements for several decades, and Switzerland recently introduced leverage limits for large banks. In this article, we review lessons from Canada's experience with regulatory leverage constraints over the past 25 years. This includes a discussion of how the limits may have affected the recent evolution of bank leverage and procyclical pressures in the Canadian financial system.

## CANADIAN REGULATORY LIMITS ON LEVERAGE

The average leverage ratio of major Canadian banks rose steadily from the early 1960s to 1980, when it peaked at about 40 (Chart 1). Against this backdrop of high and rising leverage, the statutory authority to set a maximum leverage ratio was granted in 1980. From 1982 to 1991, a formal limit of 30 was placed on the assets-to-capital multiple for large banks. However, in practice, the effective leverage constraint was below 30 over this period, as the regulator

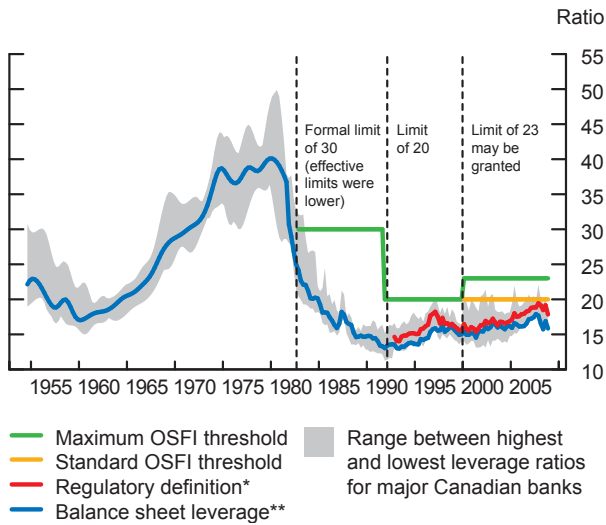
\* Jim Armstrong also contributed to this article.

<sup>1</sup> As noted by Hildebrand (2008), a leverage ratio "serves as a safety valve against the weaknesses and shortcomings of risk-weighted requirements."

<sup>2</sup> Even if the risk weights are appropriate, excessive growth in assets and leverage could increase a bank's reliance on potentially volatile short-term sources of market funding and, therefore, expose it to significantly higher levels of funding-liquidity risk.

used its discretionary power to establish lower actual limits for individual banks. In 1991, a formal upper limit of 20 was imposed, and this ceiling remained in effect until 2000 when it was decided that banks meeting certain conditions could receive an authorized multiple as high as 23.

**Chart 1: Leverage history of major Canadian banks**



\* On-balance-sheet assets plus certain off-balance-sheet items as a ratio of regulatory capital  
 \*\* On-balance-sheet assets to shareholders' equity plus subordinated debt  
 Source: OSFI

The regulatory measure of leverage in Canada is the ratio of total balance sheet assets and certain off-balance-sheet items to total regulatory capital (adjusted net Tier 1 and Tier 2 capital).<sup>3</sup> The off-balance-sheet items include all direct contractual exposures to credit risk—including letters of credit and guarantees, transaction-related contingencies, trade-related contingencies, and sale and repurchase agreements. These off-balance-sheet exposures are included at their notional principal amounts.

Various factors are considered when setting the assets-to-capital limit for individual institutions, including operating and management experience, earnings, asset diversification, type of assets, and appetite for risk (OSFI 2007). The standard limit is 20, but a lower level may be set for individual institutions. Based on the above criteria, a newly established bank will usually have a very low limit (as low as 5), and many small banks are subject to limits that have kept their assets-to-capital multiples in the range of 10 to 12.

<sup>3</sup> Since quarterly data for the regulatory definition of leverage are not available before 1993, Chart 1 also reports an alternative measure that is the ratio of total on-balance-sheet assets to shareholders' equity and subordinated debt. The two measures have followed similar trends over the period during which data for both series are available, although the level of the regulatory measure is about 0.9 higher on average.

Since 2000, banks in good standing have been allowed to increase their limit to a multiple as high as 23, if they meet a set of preconditions and provide a satisfactory forward-looking business case. For example, the institution must demonstrate that it does not have undue risk concentrations, and the business case must link the higher limit to lower-risk activities (such as residential mortgages and well-secured repo transactions). Five of the six major banks have had their limits set at 23 for at least part of this period.

Banks try not to operate too close to their limit, particularly if their balance sheet tends to be volatile (as a result, for example, of heavy trading activities). If an institution operating at a higher authorized multiple exceeds that limit, or allows its risk-based capital ratios to drop below the risk-based capital targets, OSFI will reduce that institution's limit and will require it to submit an action plan for achieving the lower multiple. The institution will also be required to operate at or below the lower level for four consecutive quarters, before being reconsidered for an increase in its multiple. These provisions create an economic incentive for banks to operate with a buffer that balances the expected gains from higher leverage against the expected costs of exceeding the limit after encountering a shock. The size of the desired buffer may also increase with the perceived variance of potential shocks. One implication of the buffer is that the regulatory limits may be constraining behaviour, even if observed leverage is not at the authorized maximum.

## THE IMPACT OF REGULATORY LIMITS

We now examine trends in historical leverage ratios to assess how regulatory limits may have affected the evolution of leverage at major Canadian banks.

### Levels of leverage

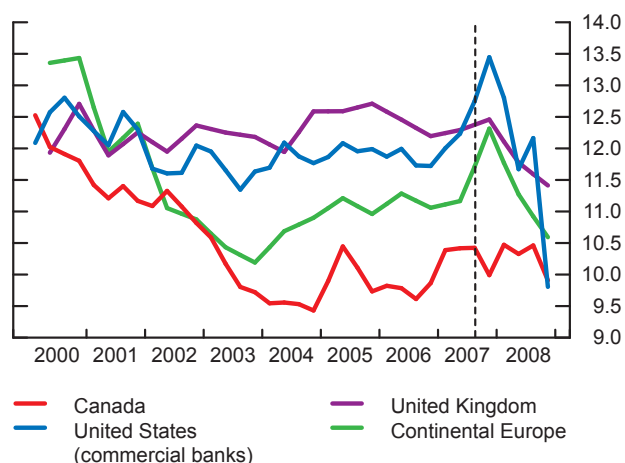
The average leverage ratio at major banks exceeded 30 continuously over a 10-year period starting in the early 1970s and reached a peak of 40 in 1980 (Chart 1). Individual institutions had ratios as high as 50 over that period. With the introduction of regulatory limits, aggregate leverage declined dramatically in 1983 to a more moderate rate of 25, and it fell further over the second half of the 1980s. It is likely that the leverage constraints contributed to this downward trend. As noted earlier, although the formal limit was an assets-to-capital multiple of 30 until 1991, the effective limits for individual banks were set at lower levels over this period (particularly after 1985).<sup>4</sup> Since 1985, the average leverage ratio has remained consistently below 20.

International comparisons provide some perspective for evaluating the role of leverage constraints in recent years.

<sup>4</sup> Data for the effective leverage constraints are not available for the 1980s; however, anecdotal information suggests that they were below 25 after 1985.

Table 1 compares the changes in risk-weighted Tier 1 capital ratios and unweighted leverage ratios during the years leading up to the financial crisis. To facilitate comparison, the Tier 1 ratio is inverted so that an increase implies higher risk-weighted leverage. To achieve a consistent definition across countries, leverage is defined as the ratio of on-balance-sheet assets to shareholders' equity. Thus, if the leverage ratio rises by more than the inverted Tier 1 ratio, it would be explained by two potential factors: (i) an increase in the ratio of unweighted assets to risk-weighted assets, and/or (ii) Tier 1 capital rising at a faster rate than shareholders' equity. While explanation (i) could reflect a shift towards safer assets, it may also occur if the risk weights were not adequately capturing an increase in the true risk exposures. To isolate the relative importance of these two factors, Table 1 also reports changes in the ratio of unweighted assets to Tier 1 capital.

**Chart 2: Inverted Tier 1 capital ratio**



Sources: Bloomberg and bank financial statements

**Table 1: Changes in Inverted Tier 1 Capital Ratios and Leverage**

(2003Q4 to 2007Q3)

	Canada	U.S. commercial banks	U.S. investment banks	United Kingdom	Europe
Inverted Tier 1 ratio <sup>a</sup>	0.7	1.2	n.a.	0.2	1.5
Unweighted leverage ratio					
- UWA <sup>b</sup> to Tier 1 capital	2.3 <sup>c</sup>	1.5	n.a.	-5.1	18.3
- UWA to shareholders' equity	1.2	-0.3	8.1	7.0	5.9

a. Ratio of risk-weighted assets to Tier 1 capital

b. UWA is unweighted on-balance-sheet assets.

c. The change is 2.6 using the Canadian regulatory definition of leverage.

The inverted Tier 1 ratios show small increases for both Canadian banks and major international peers over the period up to the third quarter of 2007 (Table 1 and Chart 2).<sup>5</sup> However, the trends for unweighted leverage ratios are less uniform across countries.<sup>6</sup> Measured by the ratio of unweighted assets to shareholders' equity, the average leverage ratio in Canada rose by only 1.2 during those years, in contrast to the significantly greater increases at major banks in a number of countries not subject to

regulatory constraints (Table 1 and Chart 3).<sup>7,8</sup> As noted previously, U.S. commercial banks are also subject to leverage requirements. Leverage at those institutions was stable in recent years, whereas leverage at U.S. investment banks (not subject to these constraints) began trending sharply upwards starting in 2004.

The combination of stable Tier 1 ratios and sharply rising leverage at some banks illustrates that risk-adjusted capital requirements were not sufficient to prevent a significant cyclical buildup of leverage in some countries in the pre-crisis period. This experience provides several lessons. First, in light of subsequent developments, it suggests that some risks were not being measured properly over this period. For example, weaknesses of risk-assessment methods led to the underpricing of risks in the trading book, which would have contributed to risk-adjusted capital ratios remaining relatively stable while leverage increased sharply at banks with high trading book activity (see CGFS 2009). The pronounced divergence between weighted and unweighted ratios in some countries also suggests that a simple leverage ratio would be a useful tool to complement the risk-weighted measure.<sup>9</sup>

<sup>5</sup> The international comparisons use data for six major Canadian banks, ten large national and regional U.S. commercial banks, five large U.S. investment banks, six major U.K. banks, and nine major continental European banks.

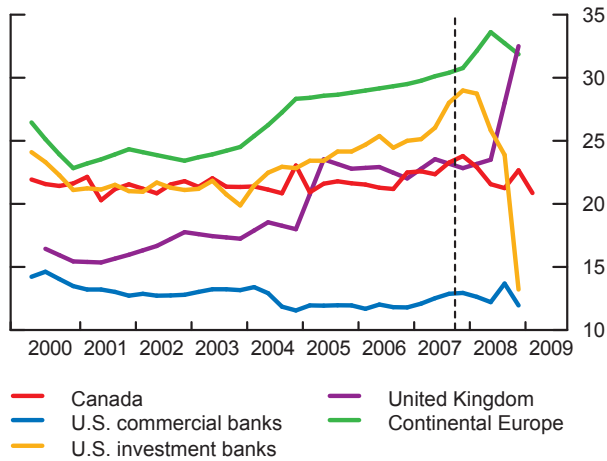
<sup>6</sup> Accounting differences can affect international comparisons of measured leverage. For example, U.S. GAAP practices allow reporting of net derivative positions on the balance sheet, whereas Canadian GAAP and International Financial Reporting Standards (IFRS) require reporting of gross derivative positions. This difference means that the level of leverage at U.S. banks is understated relative to Canadian leverage.

<sup>7</sup> The average leverage ratio increased to 30 at the world's 50 largest banks (CGFS 2009).

<sup>8</sup> When measured as the ratio of unweighted assets to Tier 1 capital, leverage in the United Kingdom fell over this period (Table 1). Since the risk-adjusted Tier 1 ratio was virtually unchanged, this implies that there was a shift towards assets with higher risk weights. The difference between the two unweighted U.K. measures indicates that shareholders' equity decreased as a proportion of Tier 1 capital. The net effect is that the ratio of on-balance-sheet assets to shareholders' equity rose relative to the inverted Tier 1 ratio.

<sup>9</sup> Hildebrand (2008) uses recent Swiss experience to emphasize the complementary role of a leverage ratio: "Looking at risk-based capital measures, the two large Swiss banks were among the best-capitalised large international banks in the world. Looking at simple leverage, however, these institutions were among the worst-capitalised banks. With the benefit of hindsight, we clearly should have put more emphasis on the risks of excessive leverage."

**Chart 3: Banking sector leverage\***



\* Ratio of on-balance-sheet assets to total shareholders' equity  
Sources: Bloomberg and bank financial statements

While it is difficult to quantify the effect of the leverage constraint, the above evidence suggests that it helped to mitigate the cyclical buildup in leverage in Canada.<sup>10</sup> The relatively low levels of leverage at the start of the financial crisis have meant that Canadian banks have faced less pressure to deleverage than some of their international counterparts, thereby mitigating the procyclical movements in the current downturn. Since the start of the financial crisis, the leverage ratio has moved within a narrow range in Canada. Elsewhere, capital injections have led to sharp reductions in leverage at U.S. investment banks, whereas increases in the notional value of derivative assets pushed the leverage of U.K. banks higher through the end of 2008 (Chart 3). Declines in capital caused by writedowns contributed to leverage remaining comparatively high for major banks in continental Europe.

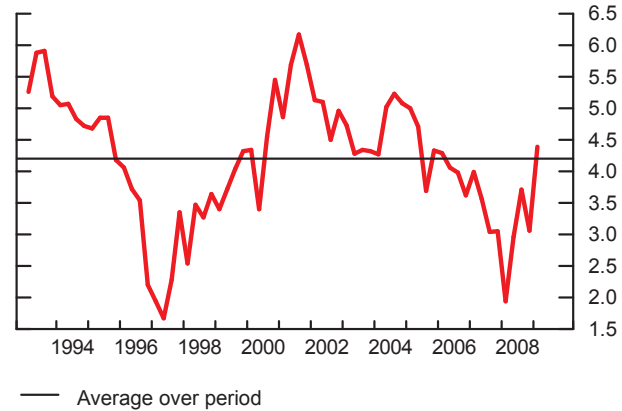
### Trends in leverage buffers

As noted earlier, a bank will maintain a buffer as it balances the incentives to expand leverage against the costs of exceeding the limit. During the upswing of a credit cycle, it is expected that the leverage buffer would tend to decrease, but the need to satisfy the leverage constraint on an ongoing basis should ultimately restrain further decreases. To consider these questions, we examine how the buffer moves over a cycle and whether bank behaviour changes as leverage approaches the regulatory limit.

Chart 4 shows that the buffer between a bank's actual leverage and its authorized limit varies over time.<sup>11</sup> The typical buffer was elevated in the early 1990s in the aftermath of a recession and shrank when the economy strengthened. The average buffer moved up again in 2001 as output growth weakened and as the maximum assets-to-capital multiple was raised to 23 for qualifying institutions. It then fell back closer to the sample average in the following years.

**Chart 4: Average buffer between actual leverage and its limit varies over time**

Major Canadian banks



Source: OSFI

The buffer has a moderate negative correlation with a simple indicator of cyclical credit conditions, indicating some tendency to decline during boom periods.<sup>12</sup> However, there is empirical evidence that procyclical movements in leverage are mitigated by adjustments in behaviour. If some development pushes leverage too close to the authorized limit (as might occur during the upturn of a credit cycle), some banks tend to react by quickly raising the buffer in subsequent quarters.<sup>13</sup> This pattern is further evidence that the regulatory limit has helped to constrain procyclical increases in leverage ratios.

### OTHER ISSUES

Several issues have been raised regarding potential adverse incentives arising from the use of unweighted leverage constraints. These issues are briefly reviewed in light of the Canadian experience.

<sup>10</sup> The discussion of leverage buffers in the next section provides further guidance on the impact of the regulatory constraint.

<sup>11</sup> Chart 4 reports leverage buffers starting in 1993 because quarterly data for the regulatory measure of leverage are not available for previous years, and information on the effective leverage constraints at individual banks is not available before 1991.

<sup>12</sup> The average buffer exhibits a correlation coefficient of -0.35 with the trend in aggregate real credit growth (measured by the current four-quarter growth rate).

<sup>13</sup> Crawford, Graham, and Bordeleau (2009) provide further statistical analysis, using data for individual banks.



A common criticism of a leverage ratio defined to include only on-balance-sheet assets is that it creates an incentive for banks to move assets off their balance sheets to bypass the leverage constraint. The Canadian regulatory measure does include some off-balance-sheet items (specifically, direct contractual exposures). Regarding other types of off-balance-sheet activity, securitized assets of major banks are currently a relatively small percentage (about 10 per cent) relative to their total on-balance-sheet assets. The gap between the regulatory definition of leverage and an augmented measure including securitized assets has risen somewhat in recent years, although part of the increase reflects a change in the reporting of securitization data (Chart 5).<sup>14</sup> A range of factors has led to greater securitization in many countries, so it is difficult to gauge to what extent the increase in Canada reflects incentives arising from the leverage constraint as opposed to other factors. Overall, the diversion of activity to off-balance-sheet assets does not appear to have significantly affected the trends for the regulatory measure in Canada. Nevertheless, broadening the coverage of off-balance-sheet assets in the regulatory definition of leverage would be a useful issue for future review.

A second potential concern is that banks will shift the mix of activity towards riskier assets as a way to boost their income when the leverage constraint is limiting overall balance sheet growth. In Canada, the ratio of risk-weighted assets to total balance sheet assets has been falling—not rising—in recent years, although the risk-measurement

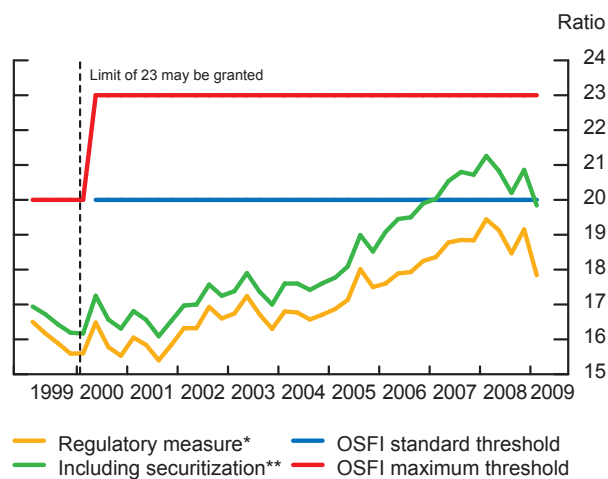
issues discussed previously may suggest some caution when using this indicator. Realized losses since the beginning of the crisis could also be used as an indicator of risk-taking behaviour before the crisis. All else being equal, the hypothesis predicts that jurisdictions with a leverage constraint (and thus an inducement to invest in riskier assets) would tend to have higher losses during the downturn. However, the available data show that capital market writedowns and loan losses at Canadian banks have been lower (relative to shareholders' equity) than for many of their international peers. Thus, despite the incentive to shift towards riskier assets when the constraint is binding, there is little evidence that this type of behaviour was prevalent in the years leading up to the financial crisis. This suggests that other aspects of the supervisory regime have mitigated the potential adverse effects on risk-taking behaviour.

## CONCLUSIONS

This article reviewed some lessons from the Canadian experience with leverage constraints over the past 25 years. The role of a leverage constraint is to act as a complement—not a substitute—for risk-weighted measures of capital adequacy. More broadly, it should be viewed as one component of the regulatory regime, rather than as a substitute for other risk-management and supervisory practices. Leverage at major Canadian banks was relatively stable during the years leading up to the financial crisis, in contrast to the significant increases at banks in a number of countries without leverage constraints. There is also evidence that some banks tend to raise their leverage buffers quickly when a shock pushes leverage too close to the authorized limit, which suggests that the limit helps to constrain increases in leverage during the upturn of a credit cycle. Relatively low levels of leverage at the start of the crisis have reduced the pressure for deleveraging during the downturn.

Various international groups, including the recent G-20 Working Group (2009) and the Basel Committee on Banking Supervision, have included a non-risk-based supplementary measure of capital adequacy on their lists of policy options to reduce procyclicality and strengthen the resiliency of the global financial system. When designing a supplementary leverage requirement, it will be important to mitigate the risk that it will create incentives for banks to shift activity to off-balance-sheet instruments or riskier assets. Strategies to achieve this objective would include selecting an appropriate definition of the regulatory measure, and designing the risk-weighted and simple leverage requirements in ways that avoid arbitraging behaviour.

**Chart 5: Leverage of major Canadian banks**



\* On-balance-sheet assets plus certain off-balance-sheet items as a ratio of regulatory capital  
 \*\* Includes unrecognized securitization of banks' own and third-party assets. Coverage of securitization data was broadened in 2006 (see footnote 14).  
 Source: OSFI

<sup>14</sup> Data collected on third-party securitized assets were expanded in 2006 to include all vehicles sponsored or administered, rather than only those with recourse provisions.

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