Basel II and Required Bank Capital

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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.

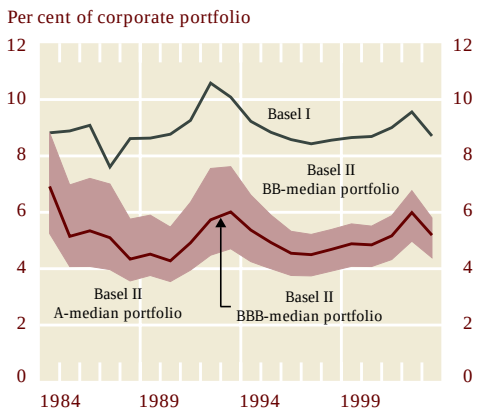
Both methods are based on data that pertain to only large Canadian corporations.[6] However, these two methods are simplified characterizations of common techniques that banks use to measure credit risk. These assumptions and data are fed into Basel II's Advanced IRB model to generate our simulated results.

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

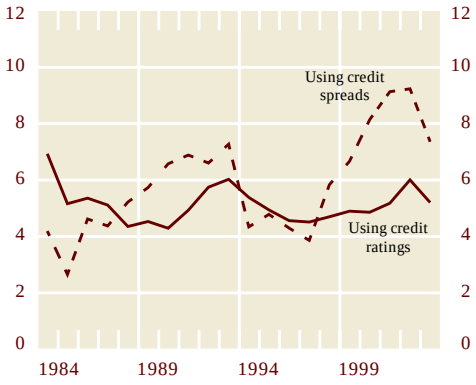
For the Canadian Banking System, 1984–2003

	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

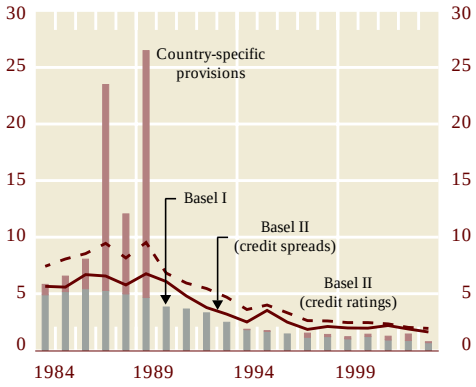


Both ratios include minimum required capital for unexpected loss, required specific provisions for expected loss, and a charge for operational risk. A median portfolio rating of BBB+ and an LGD of 45 per cent are assumed.
Source: Authors' calculations based on BIS (2002)

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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