

# Covered Bonds as a Source of Funding for Banks' Mortgage Portfolios

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- Covered bonds funded only about 3 per cent of the assets of the largest banks and 9 per cent of Canadian mortgages in 2017. Instead, banks have been relying primarily on relatively cheap government-guaranteed mortgage funding options.
- An increasing portion of mortgages are uninsured and not eligible for government-guaranteed funding, creating the need for alternative funding sources. Covered bonds may fill part of this need, helping to generate a diversified and stable funding mix for mortgages.
- Overcollateralization requirements and dynamic replenishment of the collateral pool can increase risks to unsecured creditors. This could add to the fragility of a bank in the face of negative shocks, with potential spillovers to other parts of the financial system.
- Several policy tools are available to help balance the costs and benefits of covered bonds. These include simple issuance caps and adjustments to the pricing of deposit insurance premiums, as well as other types of prudential regulation.

## Introduction

Banks' choices for funding mortgages and other business activities have an important effect on how efficiently they provide banking services and how effectively they manage risks to their own business and to the financial system. Canadian banks typically use a broad array of funding sources, including equity, deposits and wholesale funding instruments (**Chart 1**).<sup>1</sup>

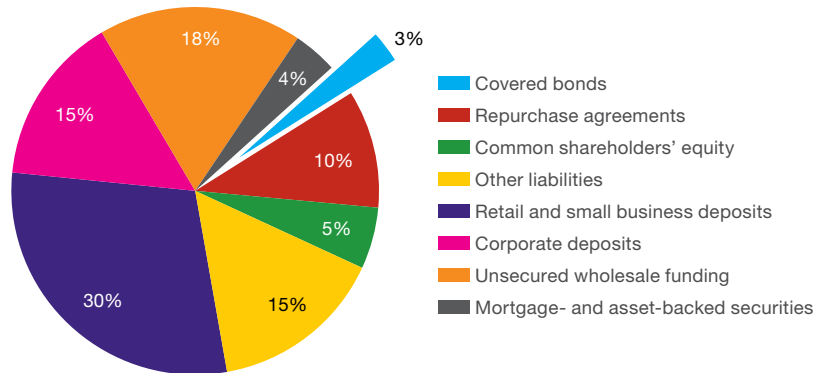
The terms of funding sources differ, ranging from short-term deposits and money market instruments to longer-term funding, including covered bonds and 5- and 10-year debentures. It is important that the terms of funding instruments match the terms of the assets they are funding to minimize the liquidity and interest rate risks of maturity transformation. Around half of Canadian mortgages have terms of 3 to 5 years, creating a demand for funding instruments with similar terms.

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<sup>1</sup> See Truno et al. (2017) for a broader discussion of Canadian bank funding.

**Chart 1: Covered bonds make up a small slice of the funding of the Big Six banks**

Total funding is Can\$6,097 billion



Note: The Big Six Canadian banks are the Royal Bank of Canada, Toronto-Dominion Bank, Bank of Nova Scotia, Bank of Montreal, Canadian Imperial Bank of Commerce and National Bank of Canada.

Source: Regulatory filings of Canadian banks

Last observation: December 2017

Some sources of longer-term funding, including covered bonds, are secured, that is, backed by specific collateral. Other instruments are unsecured, meaning they are backed only by the general creditworthiness of the issuer. In choosing between secured and unsecured funding sources, banks face a trade-off. Secured funding is generally safer for the investor and can therefore be obtained less expensively by the issuer. But the additional safety of secured funding results in a bank's risks being more concentrated on unsecured investors. For example, unsecured investors face potentially lower recovery rates should the bank default, since some assets are reserved for secured investors. This can result in higher costs for unsecured funding. It could also make the bank more sensitive to adverse shocks. The greater concentration of risk on unsecured investors may make it more likely, for example, that they would withdraw funding if negative information about a bank's asset values was revealed. A bank with a large amount of secured funding may therefore face a higher probability of runs on its unsecured funding.

Banks should recognize this potential for fragility and incorporate it in their decision making by choosing a moderate amount of secured funding that is appropriate for the riskiness of their assets. But fragility can also trigger potential negative spillovers to other parts of the financial system. Policy and regulation are therefore needed to balance the costs and benefits of the choice of funding sources for the entire financial system.

In Canada, banks rely on secured funding provided by *National Housing Act* Mortgage-Backed Securities (NHA MBS) to provide low-cost term funding for insured mortgages. This funding is guaranteed by the federal government. But, by tightening mortgage insurance policies, the government has increased the use of uninsured mortgages, which are not eligible for NHA MBS. Thus, it is also necessary to consider options for funding non-government-backed, uninsured mortgages. Mordel and Stephens (2015) discuss other secured funding options for uninsured mortgages, including private-label securitizations.

Covered bonds are another low-cost option for fulfilling the demand for non-government-backed mortgage funding. From a financial stability perspective, they provide stable funding over terms that match Canadian mortgage lending. But if covered bonds are used excessively, they may create fragility by increasing risks to unsecured investors.

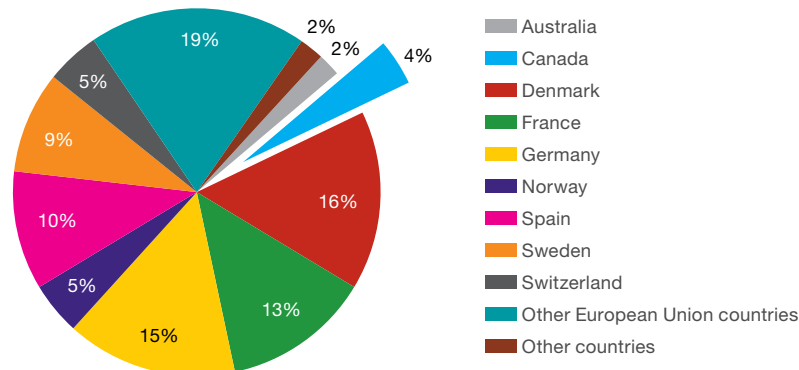
The next section discusses the origins and mechanics of covered bonds. Information on the characteristics of the Canadian and global covered bond markets follows. A framework for analyzing the costs and benefits of covered bonds is then presented, based on research by Ahnert et al. (2017). Finally, various policy options to balance those factors are examined.

## What are covered bonds and how do they work?

Covered bonds are senior secured tradable debt issued by banks. They originated in 18th-century Prussia following the Seven Years' War (1756–63) and in Denmark after the Fire of Copenhagen in 1795. After the devastation of war and natural catastrophe, it became difficult to convince lenders that unsecured loans needed to finance reconstruction would be repaid. In their place, secured loans set up under government rules created the trust needed to restart lending.

Over the past two centuries, the covered bond market has grown to become a cornerstone of bank funding in Europe. In North America, however, its role has traditionally been much more limited. This can be partly attributed to the availability of other inexpensive funding sources for mortgage portfolios and to the lack of specific legislative frameworks to govern covered bond issuance. However, interest in covered bonds was spurred by the 2007–09 global financial crisis, as covered bonds were considered a means of reviving mortgage finance (Paulson 2009; Soros 2010; Campbell 2013). Issuance of covered bonds has increased in the United States and Canada in the past decade, although outstanding volumes are a small fraction of total global volumes. Outstanding covered bonds worldwide were around 2.5 trillion euros at the end of 2016, with most issuance still in Europe (Chart 2).

**Chart 2: The global covered bond market was around 2.5 trillion euros at the end of 2016, with issuers concentrated in Europe**



Source: European Covered Bond Council

Last observation: December 2016

Like other forms of secured funding, covered bonds are collateralized, typically by a segregated pool of high-quality assets. The most common form of collateral both in Canada and other countries consists of residential and commercial mortgages. Covered bondholders are protected by overcollateralization, which can vary significantly across jurisdictions. For example, a cover pool of residential mortgages worth \$115 is set aside to use as collateral for a covered bond offering worth \$100. This pool of assets is then ring-fenced, or encumbered, and thus rendered bankruptcy-remote. In bankruptcy, covered bondholders are ensured better recovery values because they have priority access to the assets in the cover pool.

Covered bonds have some unique features that separate them from securitizations, such as residential mortgage-backed securities and other forms of asset-backed securities. First, the cover pool remains on the balance sheet of the issuing bank. Second, banks must replace non-performing assets in this pool with performing assets of equivalent value and quality to maintain the requisite collateralization. This replacement is known as “dynamic replenishment.” Third, covered bondholders are protected by “dual recourse,” whereby they have a claim on both the pool and the issuing bank upon the default of the issuer. Thus, if their preferential claim to the cover pool assets is insufficient, covered bondholders can claim the shortfall from the issuer on equal footing with unsecured creditors.

Specific legislation is crucial for developing a covered bond market, given the unique and complex legal structure of a covered bond claim (Schwarcz 2011). Upholding such a claim in a regular commercial court may be time-consuming, expensive or uncertain. However, by giving investors greater certainty in their claims, designated covered bond legislation tends to foster the development of private covered bond markets. The standardization that comes with legislation, which governs such issues as eligibility criteria for cover pool assets and minimum overcollateralization requirements, also enhances liquidity in secondary markets.

Legislation was introduced in the European Union in the 1990s that encouraged issuance from a broader set of European countries, such as France, Luxembourg and Spain (Mastroeni 2001). Canada, however, lacked a formal framework until legislation came into force in June 2012 and final rules were established by the Canada Mortgage and Housing Corporation (CMHC) in December 2012. There are currently seven registered issuers in Canada: the Big Six banks and the Fédération des caisses Desjardins du Québec. **Box 1** provides more details on the covered bond framework in Canada.

## The Canadian covered bond market in a global context

Covered bonds have traditionally been most important in continental Europe; European Union countries accounted for around 83 per cent of both global covered bonds outstanding and issuance in 2016 (Chart 2). Other major issuers include, in descending order of outstanding covered bonds, Switzerland, Norway, Canada and Australia. While most covered bonds are large standardized public securities referred to as benchmark bonds, some countries, such as Germany and Spain, do significant amounts of private placements.

Global issuance has increased steadily since 2003, and covered bonds had relatively stable issuance throughout the global financial crisis (Wandschneider 2014). However, global issuance declined by about 40 per cent in 2013, likely driven by balance sheet deleveraging by European banks and the extraordinary monetary policy measures of the European Central Bank. Covered bond issuance has yet to regain its 2012 peak (Chart 3).

## Box 1

## The legislative and regulatory framework for covered bonds in Canada

Canadian banks have issued covered bonds since 2007, with the total outstanding growing to more than \$60 billion in 2012, when a specific legislative framework was introduced to govern them.<sup>1</sup> In 2012, the Government of Canada created federal legislation for covered bonds to support financial stability by helping banks diversify their funding sources. The 2012 federal budget amended the *National Housing Act* and gave the Canada Mortgage and Housing Corporation (CMHC) responsibility for administering covered bond programs in Canada. This framework provides for statutory bankruptcy protection for covered bond investors and promotes the appropriate disclosure requirements, as well as continuity (and ultimate repayment) of issued covered bonds. Issuers must register covered bond programs under a Canadian covered bonds registry, which the CMHC is responsible for maintaining. Banks may not issue covered bonds outside of this legislative framework, and covered bonds issued under their program must be rated by at least two rating agencies.

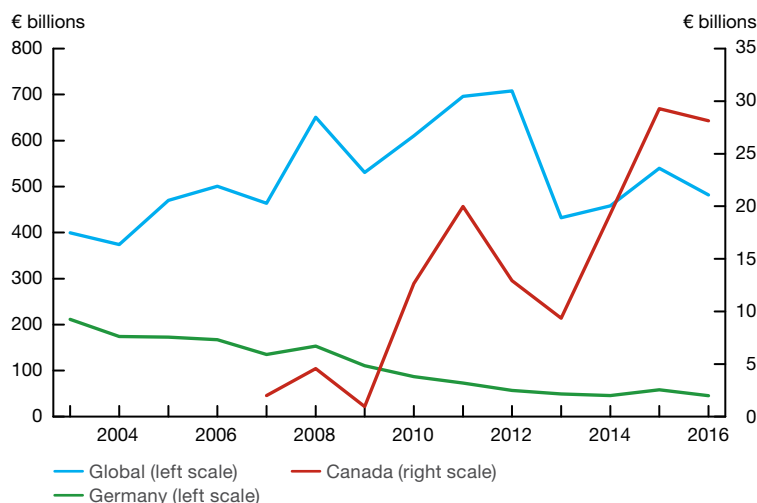
The primary sources of covered bond collateral are uninsured Canadian residential mortgage loans, consisting of mortgages for residential properties in Canada with a maximum loan-to-value ratio of 80 per cent at origination. Pre-legislation covered bond programs included insured mortgages, but they are no longer allowed in covered bond

collateral to help reduce reliance on government-backed mortgage insurance and improve the liquidity of uninsured mortgages. The collateral pool can also include Government of Canada securities (and repos of Government of Canada securities) as “substitute assets,” provided they do not exceed 10 per cent of the total collateral. The maximum asset percentage of currently registered programs ranges from 93 to 97 per cent of the total outstanding (resulting in a minimum overcollateralization of between 103 and 107.5 per cent). As of 2018, CMHC introduced a mandatory overcollateralization minimum, such that the value of the cover pool collateral assets shall be at least 103 per cent of the outstanding Canadian-dollar equivalent of the nominal amount of covered bonds outstanding at all times. Issuers are required to appoint a cover pool monitor, who is responsible for ensuring accurate disclosure and adequacy of tests for asset coverage (overcollateralization), amortization and valuation (CMHC 2017).

In addition to the requirements of the covered bond legislative framework, issuers must meet the requirements of their prudential regulators. The Office of the Superintendent of Financial Institutions sets a cap on the amount of covered bonds that can be issued by federally regulated financial institutions at 4 per cent of total assets. The Canada Deposit Insurance Corporation also considers the amount of each bank’s asset encumbrance, which includes its covered bond pool, as a factor when determining deposit insurance premiums for domestic systemically important banks.

<sup>1</sup> The initial development of the market is discussed in Gravelle and McGuiness (2008).

**Chart 3: Global covered bond issuance slowed significantly in 2013 and has yet to regain its peak**



Source: European Covered Bond Council

Last observation: 2016

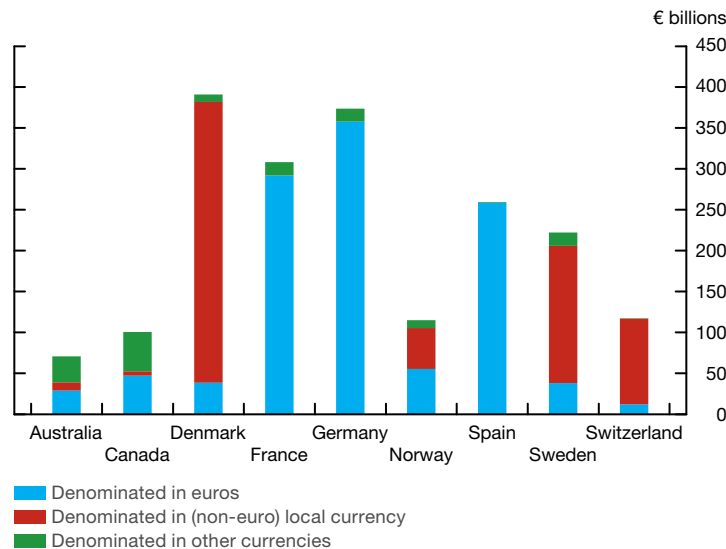
Canadian issuance has been growing since it started in 2007, with a brief slowdown in 2012 and 2013 as the new legislative framework was implemented. At the end of 2017, the Big Six Canadian banks had about Can\$140 billion in covered bonds outstanding.

Since Europe represents the largest market, it is not surprising that most covered bonds are denominated in euros, even by countries outside the euro zone (Chart 4). The exceptions are non-euro zone European countries that sometimes issue bonds in local currency due to strong domestic demand. In Canada, few covered bonds are issued in Canadian dollars, suggesting less-liquid domestic markets. Other than euro- and Canadian-dollar-denominated issuances, Canadian covered bonds are issued mostly in US dollars, with lesser amounts in pounds sterling, Australian dollars and Swiss francs. While issuing in foreign currencies is indicative of market depth and investor base, it creates the need to include hedging strategies to manage currency risk.

Covered bond terms in Canada normally range from three to seven years (Poschmann 2015), which allows Canadian banks to match the maturity profile of fixed-rate mortgages. In addition to having a stable funding profile, covered bonds are generally low risk with high credit ratings and therefore provide a low-cost funding tool. Covered bonds usually trade at a tight spread to the risk-free asset. As can be seen in Chart 5, indicative funding costs show that covered bonds are less costly than non-secured funding. For example, a five-year covered bond was issued in March 2018 by a Canadian bank at a spread of around 60 basis points over Government of Canada securities, whereas deposit notes of the same maturity trade closer to a spread of 75 basis points. Canadian banks do have other sources of low-cost funding, however, such as NHA MBS and Canada Mortgage Bonds, which trade at significantly lower spreads than covered bonds due to their government guarantees.

Covered bonds make up a small but growing percentage of the mortgage funding of Canadian banks (Chart 6). At the end of 2017, outstanding issuance of covered bonds by the largest Canadian banks ranged from 2.9 to

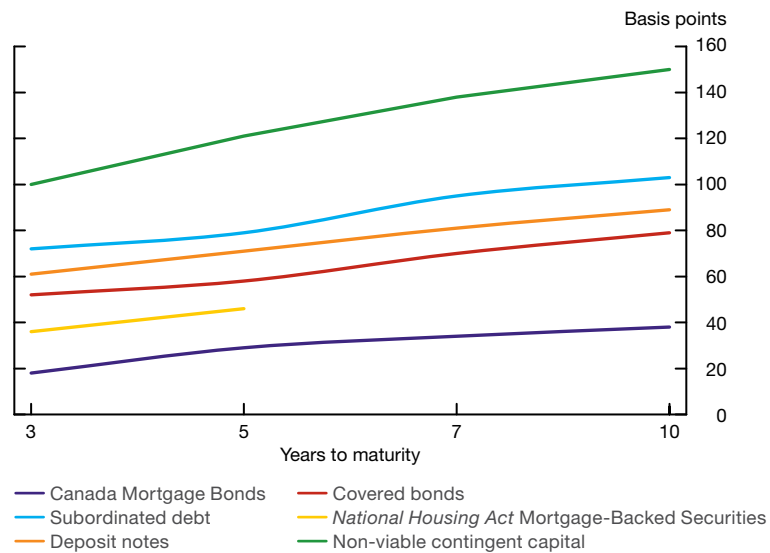
**Chart 4: Most covered bonds outstanding are issued in euros or a non-euro local currency**



3.3 per cent of total assets, or about 9 per cent of total mortgages outstanding. Canadian banks could still issue more than \$50 billion in additional covered bonds without breaching the cap of 4 per cent of total assets and would likely issue more if the regulatory cap was increased. The unused issuance amount is partly explained by banks' desire to retain a buffer space below the regulatory cap. The buffer gives banks the flexibility to manage fluctuations in asset levels and to issue additional covered bonds if other funding sources become less available. A higher regulatory cap would allow additional issuance while retaining a flexible buffer.

**Chart 5: Covered bonds provide a source of low-cost funding**

Spread over equivalent Government of Canada securities



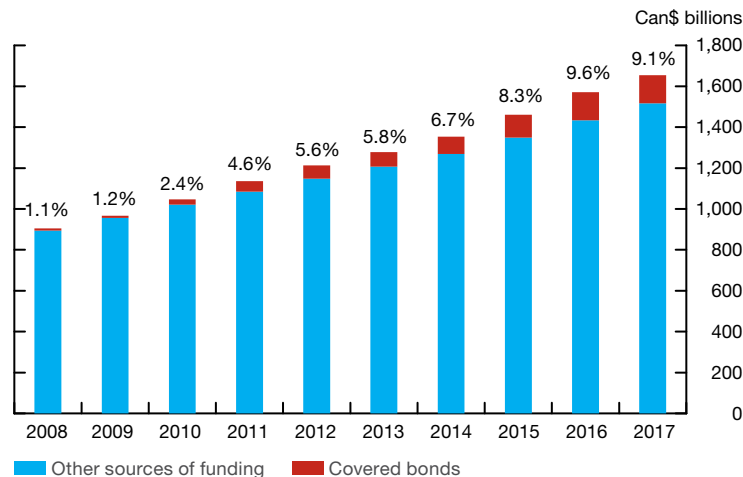
Note: Funding costs shown in the chart are exclusive of any required portfolio insurance premium, registration and administrative fees charged by the Canada Mortgage and Housing Corporation or other parties.

Source: Bank of Canada calculations based on indicative price quotes from dealers

Last observation: March 2018

**Chart 6: Covered bonds funded about 9 per cent of the mortgage portfolios of banks in 2017**

Total mortgages outstanding



Sources: Canada Mortgage and Housing Corporation, websites of registered issuers, regulatory filings of Canadian banks and Bank of Canada calculations

Last observation: 2017

In terms of demand, the investor base for covered bonds consists mainly of institutional investors, including pension funds and asset managers.<sup>2</sup> These investors are attracted by the high (usually triple-A) credit rating. Central banks also became large investors in covered bonds when these assets were designated one of the core targets under the Eurosystem's quantitative easing policy, the Covered Bond Purchase Programme. The European Banking Authority (EBA 2016) notes that central bank holdings of euro benchmark covered bonds rose from 9 per cent of total issuance in 2009 to more than 30 per cent in 2015.

## The balance sheet effects of covered bonds

To understand the implications of covered bonds, Ahnert et al. (2017) discuss a framework where banks are funded with senior secured debt (such as covered bonds) and unsecured demandable debt (such as bank deposits). This framework is designed to study the positive and normative implications of covered bond issuance. It also permits analysis of the impact of covered bonds on the fragility and pricing of unsecured debt.

Covered bond funding comes with two balance sheet effects that highlight the benefits and costs to an individual bank. The main benefit is a **direct bank funding effect**, while the principal cost of covered bonds is a **risk-concentration effect**.

### Direct bank funding effect

Covered bonds are attractive to both issuers and investors because they are relatively safe, even compared with other types of non-government-guaranteed collateralized debt. Since the assets are kept on the issuer's balance sheet, they are subject to standard prudential regulation, including capital requirements. In addition, dynamic replenishment and dual recourse imply that all assets of the bank will back covered bonds in the event of losses on the pool of encumbered assets. Both features provide strong incentives for banks to control risks in their asset portfolios.<sup>3</sup> This encourages robust underwriting practices, thereby minimizing regulatory arbitrage and avoiding some of the pitfalls with the originate-to-distribute model common in securitizations (Acharya, Schnabl and Suarez 2013).

Taken together, these features make covered bonds a relatively safe asset for private investors. Indeed, covered bonds have experienced no defaults over the past two hundred years, and delayed payments to investors have been rare (Mastroeni 2001; Wandschneider 2014). Because of their safety, covered bonds are held by "safety-seeking" investors, including those with mandates to hold high-quality, low-risk assets (e.g., pension funds). Covered bonds also receive favourable regulatory treatment when held by other banks—in the Liquidity Coverage Ratio, for example.<sup>4</sup>

Given their low risk, investors accept lower interest rates for covered bonds than for unsecured debt, making them a cheap source of funding for banks. Moreover, the duration of covered bonds can be matched to the terms of Canadian mortgages, directly adding stability to the composition of bank funding. Thus, banks may use covered bonds to diversify and stabilize their funding sources.

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<sup>2</sup> Anecdotal evidence suggests that Canadian covered bonds, particularly those denominated in euros, are attractive to bank treasuries, since they count as high-quality liquid assets under prudential regulatory requirements, such as the Liquidity Coverage Ratio.

<sup>3</sup> In this sense, covered bonds may be more desirable than private-label residential mortgage-backed securities.

<sup>4</sup> The Liquidity Coverage Ratio mandates that banks hold high-quality liquid assets to cover 30 days of liquidity requirements in a stress scenario. Highly rated covered bonds have more flexible restrictions and a lower haircut in these rules than other kinds of asset-backed securities. See Gomes and Wilkins (2013).



## Risk-concentration effect

Since the asset pool that backs covered bonds is replenished, losses (from non-performing mortgages, for example) that surpass the bank's capital are concentrated on unsecured debt holders. Thus, the more covered bonds a bank issues, the higher the riskiness of its unsecured obligations. This has an indirect effect on bank funding by increasing the cost of unsecured funding. It can also subject the bank to higher rollover risk, since a meaningful proportion of unsecured debt is short-term. Greater covered bond funding can therefore exacerbate the liquidity risk of banks and raises the probability that a negative shock to asset values could threaten the bank's viability. At the core of this result is encumbrance, whereby assets are "locked away" for covered bondholders and cannot be used to meet withdrawals by depositors and other unsecured debt holders. Encumbrance is also amplified by over-collateralization, which sets aside more assets.

Ahnert et al. (2017) offer a microprudential approach to analyzing the risk-concentration effect, starting with the fact that encumbered assets are also unavailable to a deposit insurance fund during bank resolution.<sup>5</sup> While this feature protects secured debt holders and contributes to the safety of covered bonds, it may cause losses to the deposit insurance fund. If the insurance premium charged on bank deposits does not fully reflect their asset encumbrance levels, banks have an incentive to rely excessively on covered bonds, increasing their fragility. Effectively, banks may shift risks to the deposit insurance fund, which justifies regulation of covered bonds and asset encumbrance.

From a system-wide, macroprudential perspective, the increase in bank fragility can have financial stability implications that may not be fully considered in the private choices of banks. First, higher issuance of covered bonds increases the challenges a bank faces in responding to rapid depositor withdrawals or the failure of unsecured debt holders to renew their debt. The resulting fire sale of assets can depress liquidation values for similar assets held by other banks, creating systemic risk. Second, the cost of recovering encumbered assets for secured debt holders may depend on the number of bank failures (because, for example, courts have limited capacity to process cases). Banks may not take these factors fully into account when choosing the amount of covered bonds to issue. Macroprudential regulation of covered bond use may therefore improve outcomes for the financial system overall.

## Policy tools

To address the financial stability implications of asset encumbrance on bank balance sheets, Ahnert et al. (2017) show that several policy tools can limit excessive encumbrance and bank fragility. Effective tools could include the following:<sup>6</sup>

- (i) limits on covered bond issuance or the pool of assets that backs covered bonds;
- (ii) minimum capital requirements tailored to the issuance of covered bonds; and
- (iii) a surcharge on covered bond funding paid, for example, to the deposit insurance fund.

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<sup>5</sup> Of course, once secured debt holders are paid, the residual proceeds from the cover pool can be used for unsecured debt holders and the deposit insurance fund.

<sup>6</sup> While these limits are phrased in terms of covered bond issuance, they could also apply to other forms of asset encumbrance. Guideline B-11 on Pledging from the Office of the Superintendent of Financial Institutions outlines factors that a bank's board of directors should consider in establishing policies. Pledging refers to how banks designate securities in separate accounts to serve as collateral or guarantees.

Policy-makers are paying attention to the increased encumbrance of bank balance sheets, which may heighten the fragility of the financial system (Haldane 2012; CGFS 2013). In many jurisdictions, concerns about excessive encumbrance have resulted in explicit restrictions that apply through limits on either (i) assets that can be pledged when secured debt is issued or (ii) bond issuance. The approach differs across jurisdictions, in part because rules on covered bonds must consider funding and risk-concentration effects across a range of funding instruments. For example, asset encumbrance can come from repurchase agreements and derivatives, as well as from covered bonds and securitizations. In addition, other types of rules, such as depositor preferences in bankruptcy, can influence the degree of risk concentration. **Table 1** summarizes some existing regulatory measures to limit encumbrance.

**Table 1: Prudential regulatory limits on covered bond issuance across selected countries**

| Country   | Policy  |
|---|---|
| Australia   | Value of cover pool must not exceed 8 per cent of domestic assets                                   |
| Canada  | Outstanding covered bonds must not exceed 4 per cent of total assets                                |
| Italy   | Limit depends on regulatory capital ratio   |
| Netherlands   | Limit determined on a case-by-case basis by the De Nederlandsche Bank to maintain a “healthy” ratio |
| New Zealand   | Value of cover pool must not exceed 10 per cent of total assets                                     |
| United Kingdom  | Limit determined on a case-by-case basis by the Financial Conduct Authority                         |
| Denmark, France, Germany, Norway, Spain, Sweden, Switzerland: No specific limit |   |

Sources: Poschmann (2015) and national regulators

In Italy, the encumbrance limit depends on a bank’s capital ratio (common equity Tier 1 capital), with less-capitalized banks facing stricter encumbrance limits. Ahnert et al. (2017) suggest that this approach may help curb the incentive to excessively encumber assets for banks with low capital, but it does not reduce the incentives for highly capitalized banks. Therefore, regulation should target the covered bond issuance of banks at all levels of capitalization.

The absolute level of the cap on asset encumbrance varies across jurisdictions. In the Netherlands and the United Kingdom, the cap is set on a case-by-case basis for individual banks, considering the financial position and solvency risk of the issuing bank, as well as its risk profile and the riskiness inherent in its assets (DNB 2015). Ahnert et al. (2017) indicate that the socially optimal level of covered bond issuance depends on both aggregate factors (such as the amount that banks can obtain if they need to quickly liquidate assets and the cost of recovering encumbered assets in a bankruptcy situation) and bank-specific factors (the capital ratio and the distribution of loan losses on a bank’s balance sheet). This suggests some tailoring of the cap to the individual bank’s situation. In particular, a bank’s issuance of covered bonds is higher if it has access to more profitable loan opportunities, the required return to investors is lower, it faces fewer writedowns on the loan book, recovery costs on encumbered assets are lower, liquidation values of investments are higher, and it holds higher liquidity reserves.

Interestingly, the effect of increasing the bank capital ratio on covered bond issuance is ambiguous. The additional loss-absorption capacity allows the bank to withstand higher fragility, encouraging greater covered bond issuance. But higher equity levels create more “skin in the game,” increasing the bank’s desire to limit fragility and discouraging covered bond issuance.

Increasing the cap on issuance may also help some smaller banks develop their own covered bond programs and diversify their funding sources (see the “Other vulnerabilities” section in this issue). The minimum size of a viable covered bond program is approximately \$2 billion, which may be above 4 per cent of total assets for some smaller banks. A higher cap may permit some of these banks to participate. Actions that reduce the size of the minimum viable covered bond program could also help in some cases.

Finally, Canadian financial regulators also adjust prices to reflect the risk-concentration effects of covered bonds (as in a Pigouvian tax). The deposit insurance premiums levied by the Canada Deposit Insurance Corporation on systemically important domestic banks reflect the extent to which balance sheets are encumbered. In fact, 5 per cent of the score used to calculate the premium reflects encumbrance considerations.<sup>7</sup> As noted above, Ahnert et al. (2017) suggest including asset encumbrance considerations for banks of all sizes, not just systemically important ones. However, since only the largest banks in Canada currently issue covered bonds, this is not an immediate concern. To affect bank outcomes, an appropriate calculation of deposit insurance premiums also requires a sufficiently large emphasis on covered bond issuance while acknowledging that such surcharges complement existing limits on covered bond issuance imposed by microprudential regulation.

## Conclusion

Covered bonds are a low-cost, stable funding source for banks. Unlike in Europe, where covered bond markets are well developed, only about 9 per cent of Canadian mortgage funding currently comes from covered bonds. Since government-guaranteed funding is becoming less available, a rise in covered bond issuance could help provide stable and diversified funding for Canadian mortgages.

For covered bonds to play a larger role in bank funding, raising the prudential limit for covered bond issuance is necessary.<sup>8</sup> But prudential limits and deposit insurance charges are also important to balance the costs and advantages of covered bonds. These costs include the effects on the riskiness of individual banks and on the externalities that are created if bank fragility heightens risk to the financial system.

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<sup>7</sup> The Canada Deposit Insurance Corporation uses a discontinuous scoring function to set the level of an individual bank's insurance premium. Scores above 80 imply a premium of 7.5 basis points of insured deposits, while scores below 50 require a premium of 33 basis points.

<sup>8</sup> Rudin (2018) discusses Canada's covered bond framework.

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