

The Impact of Unanticipated Defaults in Canada's Large Value Transfer System

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Canada's Large Value Transfer System (LVTS) is designed to meet international risk-proofing standards at a minimum cost to participants in terms of collateral requirements.¹ It does so partly through collateralized risk-sharing arrangements whereby participants may incur losses if another participant defaults, but the system itself is robust to default. The LVTS is designed so that participants pledge sufficient collateral to cover at least the largest possible payment obligation to the system. This does not mean, however, that *individual participants* are robust to default. Participants are responsible for managing their own risks to protect themselves from potential losses stemming from the default of another participant.² In the paper summarized here, the ability of participants to withstand such defaults is assessed by simulating unanticipated defaults in the LVTS. (In reality, there have not been any defaults in the LVTS.)

Key Features

The LVTS forms the core of the Canadian payments system. It substantially reduces systemic risk and allows Canada to meet the best international practices for handling large-value payments by applying the following risk-control elements:

- The net amount that each participant is permitted to owe is subject to bilateral and multilateral limits. Individual payments are subject to risk controls to ensure that they do not exceed these limits.
- At the beginning of each business day, participants pledge collateral to the Bank of

Canada with a value sufficient to cover the largest permitted net debit position from a single participant. This will provide the liquidity required to settle the system should one of the participants default.

- The Bank of Canada guarantees settlement in the extremely unlikely event that more than one participant defaults on a single day and that the sum of the exposures exceeds participants' pre-pledged collateral.

These elements provide participants with certainty of settlement for those payments that pass the risk-control tests.

Participants can send their payments through one of two payment streams. In the first stream, participants pledge their own collateral to cover their obligations. This stream is referred to as "defaulter pays," since, in the case of a default, the defaulter's own collateral is used to generate liquidity to settle the system. The second stream is termed "survivors pay," since, in the case of a default, the non-defaulting participants share the costs of settling the defaulter's obligations. While participants in this stream clearly bear risks related to the exposures of other participants, this stream has much lower collateral costs than the first.

In the survivors-pay stream, participants determine the limits of the exposure they are willing to assume vis-à-vis other participants and extend lines of credit accordingly. Each participant must then pledge collateral to cover a standard percentage (currently set at 24 per cent) of the largest bilateral credit limit (BCL) it has extended to any other participant. This is the maximum amount that the participant will have to contribute if one or more participants to which it has granted a BCL defaults. On the reciprocal side, each participant can incur a net bilateral position equal to the BCL that has been established for it by the grantor and a net multilateral

1. For a full description of the LVTS, see Dingle (1998).
 2. A participant is in default if it cannot meet its end-of-day net debit position.
 * This article summarizes a recently published Bank of Canada working paper (McVanel 2005).

position equal to a fixed percentage of the *sum* of the credit lines granted to it. (See Box 1 for an example.)³

Participants who end the day with an overall net debit position must find either the funds or the collateral to settle their position; otherwise, the participant is in default.⁴ Since participants in the survivors-pay stream can incur a net debit position that exceeds their collateral, default is possible in the LVTS.

If a participant defaults, its own collateral will first be used to absorb its losses. Other participants will then share in the remaining losses in proportion to the size of the BCLs they have granted to the defaulter. Participants have control over the size of the BCLs that they grant to the defaulter. They also have the incentive to set them small enough to be able, from a solvency perspective, to withstand the losses incurred in the event of another participant's default. In this study, maximum-impact defaults are generated based on actual LVTS data in order to test whether participants are indeed setting BCLs at a level sufficient to withstand their losses.

Methodology and Data

The study period spans the 170 business days from 1 March to 29 October 2004. The average daily volume and value of payments over this period were 17,063 and \$130.2 billion, respectively. Data on participant transactions, collateral, and bilateral credit limits are used to determine participants' maximum positions, shortfalls, and loss allocations.⁵ Participants' Tier 1 capital is used to determine whether they can withstand their losses.⁶

If a participant is closed by its regulator during the LVTS day, it will immediately become ineligible for further participation in the system. Our defaults are generated by assuming that each

Box 1

Example of Credit Limits

Participant A grants a BCL of 10 to participant B and one of 20 to participant C.

A must therefore pledge collateral of 0.24 (20).

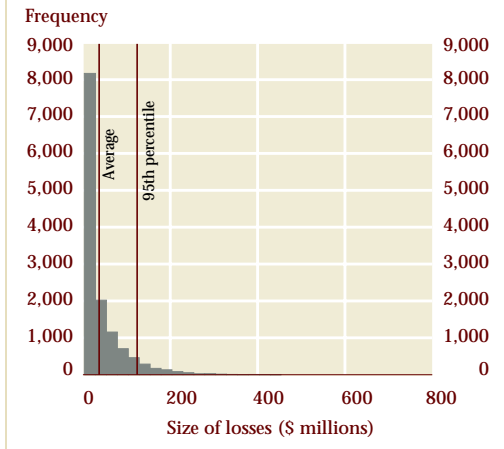
B and C grant BCLs to A equivalent to the BCL granted to them by A.

A can incur a net debit position of:

- up to 10 with B
- up to 20 with C
- overall $(B+C)$ up to $0.24 (10+20) = 7$

(Note that, since there are 15 participants in the LVTS, the multilateral constraint is less restrictive than this example would suggest.)

3. For a more detailed discussion of credit limits in the LVTS, see McPhail and Senger (2002, 46).
4. Participants can use both the collateral supporting their defaulter-pays obligations, as well as their survivors-pay collateral.
5. We thank the Canadian Payments Association for providing these data.
6. Data for federally regulated financial institutions are obtained from the website of the Office of the Superintendent of Financial Institutions, and data for all others from the websites of the institutions themselves.

Chart 1 Size Distribution of Participants' Losses

participant is closed by its regulator and is, therefore, ineligible to participate after the point when it reaches its maximum net debit position. Participants' maximum negative positions are found by simulating actual LVTS activity over our time period, using the Bank of Finland Payment and Settlement Simulator.⁷ In each case, this position is compared with the participant's collateral to determine whether survivors would incur losses. Survivors' losses are then calculated according to LVTS Rules, with survivors sharing in the losses in proportion to the size of the bilateral credit limit that they granted to the defaulter.⁸ Survivors' losses are compared with participants' Tier 1 capital holdings, and participants are deemed able to withstand their loss if their Tier 1 capital after the loss exceeds the level required by their regulator.

Results

A participant is said to have incurred a shortfall in each case where it is closed with a net debit position that exceeds the value of its collateral. Shortfalls occur in almost half of all cases. The size of the average shortfall is relatively small, about 20 per cent of the maximum allowed (based on BCLs granted), and on each participant's worst day, shortfalls are, on average, about 80 per cent of the maximum possible.

Chart 1 illustrates the size distribution of survivors' loss allocations, which are generally very small. Large participants bear nominal losses that are approximately four times larger than those of small participants, implying that the largest losses are borne by those participants most able to bear them. Loss allocations as a proportion of Tier 1 capital are very small—just 0.35 per cent, on average. But small participants absorb the largest loss allocations as a proportion of Tier 1 capital, especially on the worst days, meaning that small participants take on relatively more risk. In the worst case, losses can be as high as one-third of capital. Even here, however, the participant's capital remains higher than that required by its supervisor. Therefore, even the most significant loss would not cause any participant to fail.

7. We thank the Bank of Finland for providing the Bank of Finland Payment and Settlement Simulator for our use.

8. See McVanel (2005) for the exact formula.

To summarize, LVTS participants are in general easily able to withstand losses resulting from the default of another participant. Furthermore, the losses found in this study are probably larger than would be seen if a participant were actually to default. First, the largest possible shortfalls were created, based on the data, to maximize survivors' losses. Second, the default was assumed to be unanticipated. This prevents participants from reducing or eliminating BCLs to the defaulter to avoid sharing losses. Finally, it was assumed that survivors do not recover any of their losses.

References

- Dingle, J. 1998. "The LVTS—Canada's Large Value Transfer System." *Bank of Canada Review* (Autumn): 39–55.
- McPhail, K. and D. Senger. 2002. "The Impact of Participant Outages in Canada's Large Value Transfer System." *Bank of Canada Financial System Review* (December): 45–48.
- McVanel, D. 2005. "The Impact of Unanticipated Defaults in Canada's Large Value Transfer System." *Bank of Canada Working Paper No. 05-25*.