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**The Implementation of Monetary Policy  
in a System with Zero Reserve Requirements**

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## The Implementation of Monetary Policy in a System with Zero Reserve Requirements

The proposed new Bank Act, which the Government of Canada recently introduced in Parliament, contains provisions to phase out over a period of two years the statutory requirement on chartered banks to hold reserves against certain of their deposit liabilities. This discussion paper sets out the proposed framework for implementing monetary policy in the system with zero reserve requirements, as well as in the transitional period in which reserves are being phased out. It is intended that the framework also be used for policy implementation in the period before the proclamation of the new legislation. This period will be characterized by an increasing number of banks satisfying their reserve requirements largely with notes and coins and having to hold little or no required deposits at the Bank of Canada. The new system would also be applied to non-bank direct clearers, which have in the past not been permitted to average their daily holdings of deposits at the Bank of Canada. In a somewhat more distant future, the advent of an electronic system for the transfer of large-value electronic payments may necessitate a further re-examination of the framework.

The underlying objective of the proposed system for implementing monetary policy is to permit the Bank of Canada to exercise a degree of influence over very short-term interest rates similar to that under the current system. The system would require a direct clearer which has to take a secured overdraft loan to avoid a negative settlement position at the Bank of Canada to offset that overdraft loan, either with an excess balance at the Bank of Canada on some other day during the same calculation period,<sup>1</sup> or with an advance (at Bank Rate) equal to the difference between total overdraft loans and total excess balances over the calculation period, or to pay a fee in lieu of such an advance. Given the costs thus associated with both holdings of clearing balances and overdrafts from the Bank of Canada, the direct clearers would be induced to take prompt action in the money markets to position themselves to try to avoid such outcomes.<sup>2</sup> Hence the Bank of Canada's actions to increase or reduce the quantity of settlement balances available to direct clearers would lead the direct clearers to adjust their positions and would thus produce movements in very short-term interest rates in the direction desired.

The framework for monetary policy implementation set out in this discussion paper differs in two respects from that outlined in Discussion Paper 2, issued February 2, 1989 — it increases the calculation period from one week to four or five weeks, and it eliminates the line-of-credit feature.

The extension of the calculation period to about one month from the one week proposed in the earlier discussion paper would tend to reduce pressures for overnight rates to be volatile late in the day. As well, there is every reason to believe that in this regime the existing late-afternoon market in overnight funds would develop further. This would also help to reduce any late-day

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1 A glossary at the end of this paper defines the main technical terms used.

2 With zero reserve requirements a direct clearer would typically aim for a settlement balance near zero when its cumulative position was near zero.

volatility in overnight rates and typically allow overnight transactions conducted late in the day to be made at rates closer to those prevailing earlier the same day.

Since the lengthening of the calculation period would effectively reduce the costs of unforeseen clearing gains and losses, the line-of-credit feature of the earlier proposal is being dropped. This greatly simplifies the system.

Following the proclamation of the new Bank Act, the calculation period would end on the third Wednesday of each month, thereby eliminating periods ending on days with multiple weights. The reserve averaging period during the transitional phase-out of reserves would be altered to coincide with the calculation period. To facilitate the use of the framework in the period before the proclamation of the new legislation, the monthly calculation period would be made to terminate with the first of the two half-month reserve averaging periods now in place for the chartered banks.

The next section describes the details of the system as it would function in the period following proclamation of the new financial legislation. The subsequent section describes the system as it would function prior to the proclamation of the new legislation. In the appendix four examples are presented to illustrate how the proposed system would function in various circumstances.

#### **A. The proposed system following the proclamation of the new financial legislation**

The system for implementing monetary policy once reserve requirements had been reduced to zero would operate as follows:

1. Those banks and non-bank financial institutions that choose to be directly clearing members of the Canadian Payments Association, and therefore to settle through the Bank of Canada, would have to maintain a zero or positive settlement balance each day in their accounts at the Bank of Canada. On days in which a direct clearer would otherwise have had a negative position at the Bank of Canada, it would have to take from the Bank an overnight overdraft loan of sufficient size to eliminate the negative position. Such overdraft loans would be at Bank Rate.
2. In addition, each direct clearer would have to meet a requirement that its "cumulative computed settlement balance" equal or exceed zero over a calculation period of four or five weeks ending the third Wednesday of each calendar month. The cumulative computed settlement balance would be defined as the sum of daily positive settlement balances less the sum of all daily overdraft loans taken to avoid a negative daily position. Fridays and the days before holidays would be weighted as now in calculating the cumulative computed settlement balance over the calculation period.
3. If a direct clearer had a negative cumulative computed settlement balance on the last day of the calculation period (which would result from overdraft loans on some days that were not offset by positive balances on other days), it would have to take an

advance from the Bank of Canada equal to its cumulative deficiency. The advance would be at Bank Rate. In lieu of taking an advance (but not an overdraft), the direct clearer could agree to pay a fee to the Bank of Canada equal to Bank Rate (expressed at a daily rate) times the cumulative deficiency. This fee option is financially equivalent to an advance, but would save on the collateral required.

4. All borrowings from the Bank of Canada, whether overdraft loans or advances, would be collateralized as in the present system. No collateral would be required in the case of a fee paid in lieu of an advance.
5. There would be no restrictions on the frequency of overdraft loans or advances.
6. Arrangements between a direct clearer and an indirect clearer would be the result of direct negotiations between the two institutions.
7. The structure outlined above would permit the Bank of Canada to influence short-term interest rates in a way very similar to that under the current system. That is, by using redeposits or drawdowns of Receiver-General demand deposits to vary the quantity of settlement balances relative to the levels desired by direct clearers, the Bank of Canada could induce downward or upward pressure on very short-term interest rates. Compared to the present system, the nature of the proposed structure should tend to shorten the time lag between Bank of Canada actions and the movements of very short-term interest rates, while the system would retain the smoothing benefits of an averaging system.

During the transition period in which reserve requirements were being phased out, the same structure would prevail with the following modification for those bank direct clearers with positive required reserve deposits at the Bank of Canada:

A bank direct clearer with a positive required reserve deposit would have to meet a requirement that its cumulative computed settlement balance, as defined above, equal or exceed its cumulative required reserve deposit over the calculation period. If a bank direct clearer had a cumulative computed settlement balance on the last day of the calculation period that was smaller than its cumulative required reserve deposit, it would have to take an advance at Bank Rate from the Bank of Canada equal to its cumulative deficiency or pay a fee in lieu of such an advance, as described above.<sup>3</sup>

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<sup>3</sup> Taking an advance to meet a deficiency of the cumulative computed settlement balance with respect to cumulative required reserve deposits would always ensure that reserve requirements were met.

**B. The proposed system prior to the proclamation of the new financial legislation**

The present legislation defines the length of the reserve averaging period and does not permit fees in lieu of advances for reserve purposes. Thus, prior to the proclamation of the new financial legislation, the system described above would be modified as follows:

1. The calculation period would run from mid-month to mid-month, corresponding to two of the present reserve averaging periods for chartered banks.<sup>4</sup>
2. Advances needed by chartered bank direct clearers at the end of the statutory reserve averaging periods to meet reserve requirements (henceforth referred to as "reserve advances") would be taken as at present. These reserve advances would be included in the positive settlement balances counting towards the cumulative computed settlement balance. A direct clearer would have to take a "cumulative advance" equal to any cumulative deficiency at the end of a calculation period. Both cumulative advances and reserve advances would be at Bank Rate.<sup>5</sup>
3. In lieu of taking a cumulative advance (but not a reserve advance or an overdraft), a direct clearer could agree to pay a fee to the Bank of Canada equal to Bank Rate (expressed at a daily rate) times the cumulative deficiency.

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4 That is, the calculation period would run from the 16th of the month (or the next business day, if that day falls on a weekend or holiday) to the 15th of the subsequent month. If the 15th falls on a weekend or holiday then the previous business day will be weighted to take into account the entire weekend or holiday period (as is the case now).

5 On the last day of a calculation period, a bank direct clearer might have an overdraft, a reserve advance and a cumulative advance. A non-bank direct clearer might have both an overdraft and a cumulative advance.

## APPENDIX OF EXAMPLES OF PROPOSED SYSTEM

### EXAMPLE 1: DIRECT CLEARER WITH ZERO REQUIRED RESERVE DEPOSIT AFTER PROCLAMATION

| Date (weight) |          | End-of-day balance<br>(before overdraft loan) <sup>1</sup> | Overdraft loan <sup>2</sup> | Cumulative<br>computed settlement<br>balance <sup>3</sup> |
|---------------|----------|--|-----------------------------|---|
| Thu.          | Aug. 22  | 0  |                             | 0   |
|               | 23 (x3)  | -25  | 25                          | -75   |
| Mon.          | Aug. 26  | 0  |                             | -75   |
|               | 27       | 25   |                             | -50   |
|               | 28       | 0  |                             | -50   |
|               | 29       | -25  | 25                          | -75   |
|               | 30 (x4)  | 0  |                             | -75   |
| Tues.         | Sept. 3  | 25   |                             | -50   |
|               | 4        | -25  | 25                          | -75   |
|               | 5        | 0  |                             | -75   |
|               | 6 (x3)   | 25   |                             | 0   |
| Mon.          | Sept. 9  | 0  |                             | 0   |
|               | 10       | -50  | 50                          | -50   |
|               | 11       | 50   |                             | 0   |
|               | 12       | 25   |                             | 25  |
|               | 13 (x3)  | -25  | 25                          | -50   |
| Mon.          | Sept. 16 | 0  |                             | -50   |
|               | 17       | 0  |                             | -50   |
| Wed.          | Sept. 18 | 0  |                             | -50   |

Cumulative advance = 50

Notes:

1. This column is also equal to the daily computed settlement balance.
2. When the end-of-day balance (before overdraft loan) is less than zero, an overdraft loan in the amount of the deficiency must be taken.
3. The cumulative computed settlement balance on a given day is equal to the cumulative computed settlement balance on the previous day plus the end-of-day balance (before overdraft loan) multiplied by the weight for the day.

**EXAMPLE 2: CHARTERED BANK WITH REQUIRED RESERVE DEPOSIT = 50  
DURING TRANSITION PERIOD AFTER PROCLAMATION**

| Date (weight) |                       | End-of-day balance<br>(before overdraft<br>loan) | Overdraft loan | Daily excess<br>computed settlement<br>balance <sup>1</sup> | Cumulative excess<br>computed settlement<br>balance <sup>2</sup> |
|---------------|-----------------------|--|----------------|---|--|
| Thu.          | Aug. 22               | 50   |                | 0   | 0  |
|               | 23 (x3)               | 0  |                | -50   | -150   |
| Mon.          | Aug. 26               | 50   |                | 0   | -150   |
|               | 27                    | 0  |                | -50   | -200   |
|               | 28                    | 100  |                | 50  | -150   |
|               | 29                    | 0  |                | -50   | -200   |
|               | 30 (x4)               | 25   |                | -25   | -300   |
| Tues.         | Sept. 3               | 125  |                | 75  | -225   |
|               | 4                     | 25   |                | -25   | -250   |
|               | 5                     | 25   |                | -25   | -275   |
|               | 6 (x3)                | 25   |                | -25   | -350   |
| Tues.         | Sept. 9               | 50   |                | 0   | -350   |
|               | 10                    | 50   |                | 0   | -350   |
|               | 11                    | 50   |                | 0   | -350   |
|               | 12                    | -25  | 25             | -75   | -425   |
|               | 13 (x3)               | 25   |                | -25   | -500   |
| Mon.          | Sept. 16              | -50  | 50             | -100  | -600   |
|               | 17                    | 50   |                | 0   | -600   |
| Wed.          | Sept. 18 <sup>3</sup> | 25   |                | -25   | -625   |

Cumulative advance = 625

Notes:

1. The daily excess computed settlement balance is equal to the end-of-day balance (before overdraft loan) less the required reserve deposit.
2. The cumulative excess computed settlement balance is equal to the cumulative excess computed settlement balance from the previous day plus the daily excess computed settlement balance multiplied by the weight of that day.
3. Note that on the last day of the calculation period it is possible to have an overdraft loan and an advance.



**EXAMPLE 3: DIRECT CLEARER WITH ZERO REQUIRED RESERVE DEPOSIT  
BEFORE PROCLAMATION**

| Date (weight) |              | End-of-day balance<br>(before overdraft loan) <sup>1</sup> | Overdraft loan <sup>2</sup>                 | Cumulative<br>computed settlement<br>balance <sup>3</sup> |
|---------------|--------------|--|---|---|
| Fri.          | Aug. 16 (x3) | -25  | 25  | -75   |
| Mon.          | Aug. 19      | 0  |   | -75   |
|               | 20           | 25   |   | -50   |
|               | 21           | 0  |   | -50   |
|               | 22           | -25  | 25  | -75   |
|               | 23 (x3)      | 0  |   | -75   |
| Mon.          | Aug. 26      | 25   |   | -50   |
|               | 27           | 0  |   | -50   |
|               | 28           | -25  | 25  | -75   |
|               | 29           | 0  |   | -75   |
|               | 30 (x4)      | 25   |   | 25  |
| Tues.         | Sept. 3      | 0  |   | 25  |
|               | 4            | -50  | 50  | -25   |
|               | 5            | 50   |   | 25  |
|               | 6 (x3)       | -25  | 25  | -50   |
| Mon.          | Sept. 9      | 0  |   | -50   |
|               | 10           | 0  |   | -50   |
|               | 11           | 0  |   | -50   |
|               | 12           | -25  | 25  | -75   |
|               | 13 (x3)      | -25  | 25  | -150  |
|               |              |  | Cumulative advance <sup>4,5</sup> = 50 (x3) |   |

Notes:

1. This column is also equal to the daily computed settlement balance.
2. When the end-of-day balance (before overdraft loan) is less than zero, an overdraft loan in the amount of the deficiency must be taken.
3. The cumulative computed settlement balance on a given day is equal to the cumulative computed settlement balance on the previous day plus the end-of-day balance (before overdraft loan) multiplied by the weight for the day.
4. Because the cumulative advance is taken on a day with a weight of three, it will last for three days and be in the amount of one third of the deficiency of the final cumulative computed settlement balance.
5. When a chartered bank has a zero required reserve deposit, it will never have to take a reserve advance, since an overdraft loan will always enable it to meet its reserve requirement daily.

**EXAMPLE 4: CHARTERED BANK WITH REQUIRED RESERVE DEPOSIT = 50  
BEFORE PROCLAMATION**

| Date (weight)              | End-of-day balance (before overdraft loan) | Overdraft loan | Daily excess reserves <sup>1</sup> | Cumulative excess reserves <sup>2</sup> | Reserve advance <sup>3</sup> | Daily excess computed settlement balance <sup>4</sup> | Cumulative excess computed settlement balance <sup>5</sup> |
|----------------------------|--|----------------|------------------------------------|---|------------------------------|---|--|
| Aug. 16 (x3)               | 0  |                | -50                                | -150                                    |                              | -50   | -150   |
| Aug. 19                    | 50   |                | 0                                  | -150                                    |                              | 0   | -150   |
| 20                         | 0  |                | -50                                | -200                                    |                              | -50   | -200   |
| 21                         | 100  |                | 50                                 | -150                                    |                              | 50  | -150   |
| 22                         | 0  |                | -50                                | -200                                    |                              | -50   | -200   |
| 23 (x3)                    | 25   |                | -25                                | -275                                    |                              | -25   | -275   |
| Aug. 26                    | -25  | 25             | -50                                | -325                                    |                              | -75   | -350   |
| 27                         | 125  |                | 75                                 | -250                                    |                              | 75  | -275   |
| 28                         | 25   |                | -25                                | -275                                    |                              | -25   | -300   |
| 29                         | 25   |                | -25                                | -300                                    |                              | -25   | -325   |
| <u>30 (x4)</u>             | 25   |                | -25                                | <u>-400</u>                             | <u>100 (x4)</u>              | 75  | -25  |
| Sept. 3                    | 50   |                | 0                                  | 0                                       |                              | 0   | -25  |
| 4                          | 50   |                | 0                                  | 0                                       |                              | 0   | -25  |
| 5                          | 50   |                | 0                                  | 0                                       |                              | 0   | -25  |
| 6 (x3)                     | 25   |                | -25                                | -75                                     |                              | -25   | -100   |
| Sept. 9                    | -50  | 50             | -50                                | -125                                    |                              | -100  | -200   |
| 10                         | 50   |                | 0                                  | -125                                    |                              | 0   | -200   |
| 11                         | 50   |                | 0                                  | -125                                    |                              | 0   | -200   |
| 12                         | 25   |                | -25                                | -150                                    |                              | -25   | -225   |
| <u>13 (x3)<sup>6</sup></u> | -25  | 25             | -50                                | <u>-300</u>                             | <u>100 (x3)</u>              | 25  | -150   |

Cumulative advance = 50 (x3)

Notes:

1. Daily excess reserves (commonly referred to as "spot") equal the end-of-day balance after the overdraft loan less the required reserve deposit.
2. Cumulative excess reserves on a given day equal cumulative excess reserves on the previous day plus daily excess reserves multiplied by the weight for the day.
3. At the end of a reserve averaging period in which cumulative excess reserves are less than zero, a reserve advance in the amount of the shortfall divided by the weight of that day must be taken. The last day in the first reserve averaging period is August 30, which has a weight of four.
4. The daily excess computed settlement balance is equal to the end-of-day balance (before overdraft loan) less the required reserve deposit plus any reserve advance.
5. The cumulative excess computed settlement balance is equal to the cumulative excess computed settlement balance from the previous day plus the daily excess computed settlement balance multiplied by the weight of that day.
6. Note that on the last day of the calculation period it is possible to have an overdraft loan, reserve advance, and cumulative advance.

## GLOSSARY

**Advance** - loan taken at the end of the reserve-averaging period or at the end of the calculation period to meet requirements.

**Calculation period** - period over which the cumulative computed settlement balance is calculated. Initially the calculation period would run from mid-month to mid-month, coinciding with two of the present reserve averaging periods for chartered banks. After the proclamation of the proposed new financial legislation, the calculation periods would end the third Wednesday of each month.

**Cumulative advance** - loan taken at the end of the calculation period to meet any shortfall in the cumulative computed settlement balance relative to cumulative required reserves.

**Cumulative computed settlement balance** - the sum of daily positive settlement balances (including, for chartered banks, those resulting from advances taken at the end of the reserve averaging periods to meet statutory required reserve deposits), less the sum of all daily overdraft loans taken to avoid a negative daily position. Fridays and the days before holidays would be weighted as now in this calculation. The foregoing definition is equivalent to the sum of the weighted end-of-day balances (before overdraft loans) plus reserve-period-end advances.

**Cumulative excess computed settlement balance** - the cumulative computed settlement balance less cumulative required reserve deposits or, equivalently, the weighted sum of daily excess computed settlement balances.

**Cumulative excess reserves** - the weighted sum of settlement balances less cumulative required reserve deposits.

**Cumulative required reserve deposit** - the required reserve deposit times the number of days.

**Daily computed settlement balance** - the end-of-day balance (before overdraft loans) plus (at the end of a reserve averaging period) any reserve-period-end advance.

**Daily excess computed settlement balance** - the daily computed settlement balance less required reserve deposit.

**Daily excess reserves** - the settlement balance less required reserve deposit, commonly referred to as "spot."

**End-of-day balance (before overdraft loan)** - the balance of a direct clearer with the Bank of Canada after the clearing cycle and the drawdown or redeposit, but prior to taking an overdraft loan.

Fee in lieu - fee paid in lieu of taking an advance. Equals Bank Rate (expressed as a daily rate) times the amount by which the cumulative computed settlement balance falls short of the cumulative required reserve deposit.

Overdraft loan - loan taken to cover any shortfall in the daily settlement balance.

Required reserve deposit - the required daily deposit at the Bank of Canada to meet reserve requirements as per the Bank Act.

Reserve-averaging period - the period, as set out in the Bank Act, over which reserve requirements must be met.

Reserve advance - a loan taken to meet reserve requirements at the end of the reserve-averaging period.