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Using Simulation Analysis to Evaluate the Proposed Increase to BCLs Provided by the Bank of Canada in the LVTS

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Bank of Finland Simulator Seminar

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Outline

1. Background
2. Approach
   - Efficiency, Credit Risk, General
3. Results
   - Efficiency, Credit Risk
4. Conclusion

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Background

In LVTS, 14 private sector participants plus the Bank

LVTS has two streams: T1 and T2

In T2, Bank grants bilateral credit limits (BCLs) to each private sector participant equal to 5% of the sum of BCLs that participant has been granted by the others

Participants assert that growth of BCLs from Bank has not kept pace with payment flows to the Bank, so Bank BCLs should be raised

Thus, participants have asked Bank to increase the Bank's BCL parameter from 5% to 10%

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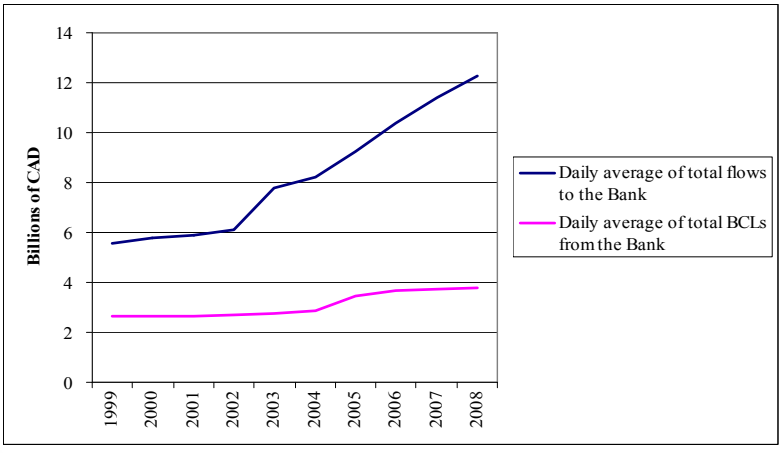
Background

Participants' assertion appears correct, ie growth in BCLs from the Bank has not kept pace with payment flows to the Bank



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Background

Increasing Bank BCL parameter from 5% to 10% would have impacts along two broad dimensions:

1. Efficiency
    - Collateral savings
    - But some potential delay
2. Risk
    - Credit risk to Bank
    - Credit risk to private sector participants

Approach is to use simulated defaults to examine impacts

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Approach - Efficiency

Unlike T1, participants in T2 do not need to fully collateralize their own multilateral net debit positions

Participants can save on collateral costs by sending more payments through T2

But constrained by bilateral and multilateral constraints

- Bilateral constraint based on size of BCL granted by intended payment recipient
- Multilateral constraint based on 30% of sum of BCLs granted by other participants (“T2NDC”)

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Approach - Efficiency

Raising Bank's BCL parameter from 5% to 10% would:

- double BCLs granted by Bank
- increase T2NDCs by 4.76 per cent

Higher BCLs and T2NDCs would enable participants to send more Bank-destined payments via T2 (instead of T1), resulting in collateral savings

But additional value sent to Bank via T2 would use up room under T2NDCs, and other T2 payments could be "crowded out"

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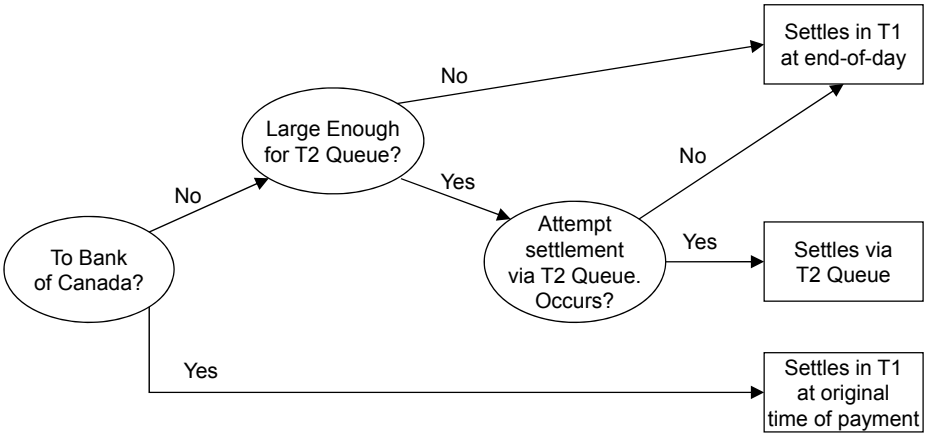
Approach - Efficiency

Assumptions re crowded-out payments:



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Approach - Efficiency

So some of the collateral savings from shifting Bank-destined payments to T2 are offset as a result of:

- Crowded-out Bank-destined payments that are settled in T1 at original time of payment
- Delay associated with crowded-out non-Bank payments settled via the T2 queue
- Delay associated with crowded-out non-Bank payments settled at end-of-day (in T1)

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Approach - Credit Risk

In event of a default, if collateral apportioned by defaulter is insufficient to cover defaulter's settlement obligation, then an "own collateral shortfall" (OCS)

- Under proposed regime, there are larger T2NDCs, but no additional T2 collateral, thus larger potential OCSs

In event of an OCS, surviving participants that granted a BCL to defaulter, including the Bank, face "additional settlement obligations" (ASO)

- Under proposed regime, Bank's ASO would increase to 9.09% of OCS (from 4.74% of OCS under current regime)

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Approach - Credit Risk

Bank also faces credit risk under residual guarantee

- If more than one default in same day, could be insufficient collateral apportioned to system to cover obligations of defaulters, in which case Bank guarantees settlement
- Under proposed policy, potentially greater credit risk to Bank from guarantee, but simulation analysis only examines single-participant defaults

Proposed policy affects credit risk of private sector too

- Private sector faces smaller share of OCSs, but there are larger potential OCSs to be shared

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Approach - General

We undertake single-participant default simulations using three months of LVTS data (June – August 2008)

Each day, each participant shut down when it has incurred largest multilateral net debit position (T1 + T2)

- 14 participants x 64 days = 896 simulated defaults

For each default, net debit position of defaulter compared with defaulter's apportioned collateral (note: for T1 collateral, we use "minimum necessary" collateral)

- If net debit position > collateral then OCS > 0
- If net debit position ≤ collateral then OCS = 0 (no shortfall)

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Results – Efficiency

Significant collateral savings for system:

Group of Surviving Private Sector FIs	Average % Change in Daily Collateral Required	% of Days in which Collateral Requirements Decreased	% of Days in which Collateral Requirements Increased
All	-12.50 %	56.36 %	2.34 %
Big 6	-15.48 %	58.59 %	4.17 %
Small 8	-10.25 %	54.69 %	0.98 %

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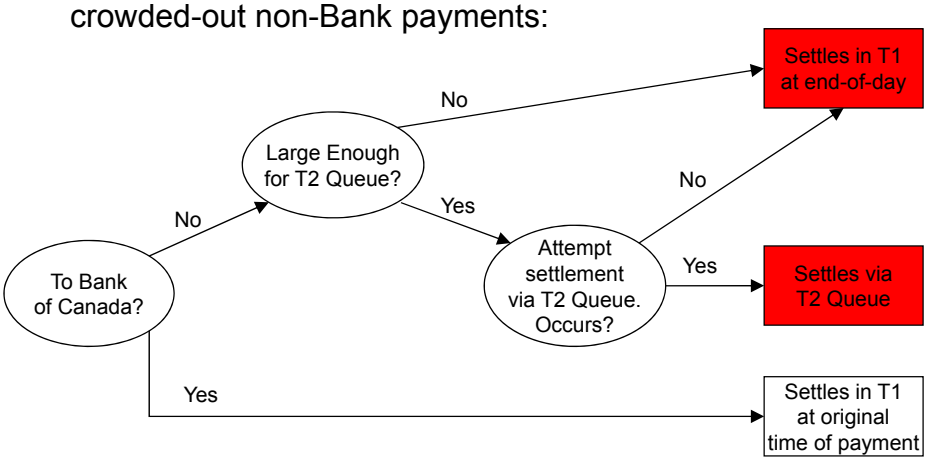
Results - Efficiency

Must keep in mind increased delay associated with crowded-out non-Bank payments:



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Results – Efficiency

Measure of Delay			Base Case (5%BCL)	Revised Case (10% BCL)	Growth
Payments Queued in T2	Number of Payments	Daily Average	7.86	19.48	147.84 %
		Maximum	16	39	143.75 %
	Value of Payments	Daily Average	$5.66 billion	$9.04 billion	59.72 %
		Maximum	$11.21 billion	$17.53 billion	56.38 %
Crowded-Out Non-Bank Payments Settled at End-of-Day in T1	Number of Payments	Daily Average	0	15.05	n/a
		Maximum	0	74	n/a
	Value of Payments	Daily Average	0	$523 million	n/a
		Maximum	0	$2.21 billion	n/a

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Results – Credit Risk

Higher probability of own collateral shortfall (OCS) resulting from default

If there is a shortfall, then on average it is higher

Single largest shortfall is also higher

Measure of Credit Risk		Base Case	Revised Case	Growth
Percent of Defaults Resulting in OCS		54.69 %	64.17 %	17.35 %
Average OCS	Including OCS = 0 (ie including cases with no shortfall)	$391,184,347	$491,145,613	25.55 %
	Excluding OCS = 0 (ie conditional on shortfall occurring)	$715,308,520	$768,004,309	7.37%
Single Largest OCS		$4,157,702,942	$4,386,074,125	5.49 %

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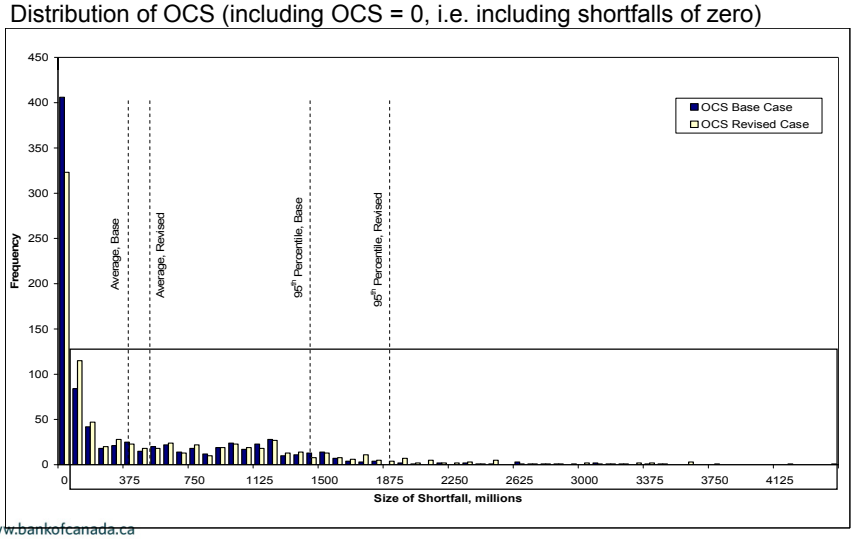
Results – Credit Risk

Distribution of OCS (including OCS = 0, i.e. including shortfalls of zero)



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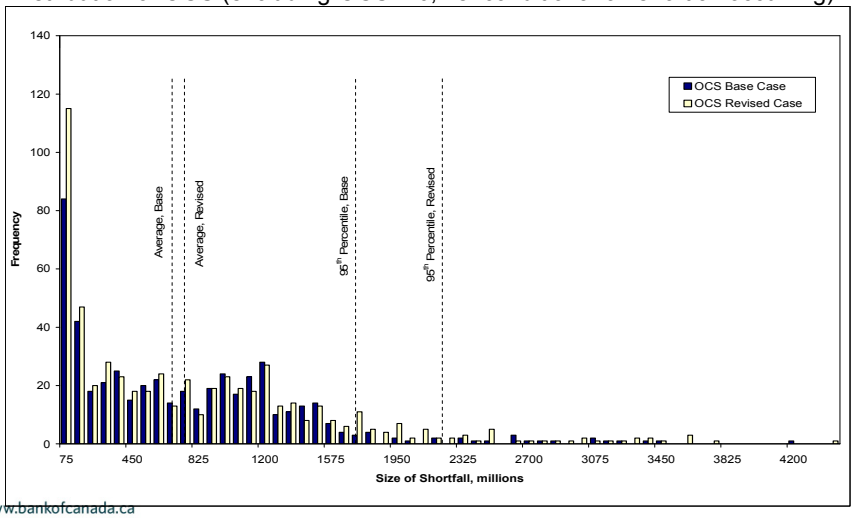
Results – Credit Risk

Distribution of OCS (excluding OCS = 0, i.e. conditional on shortfall occurring)



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Results – Credit Risk

Higher probability of Bank ASO resulting from default

If there is a Bank ASO, then on average it is higher

Single largest Bank ASO is also higher

Measure of Credit Risk		Base Case	Revised Case	Growth
Percent of Defaults Resulting in Bank ASO		54.69 %	64.17 %	17.35 %
Average Bank ASO	Including Bank ASO = 0	$18,627,826	$44,649,601	139.69 %
	Excluding Bank ASO = 0	$34,062,310	$69,818,574	104.97 %
Single Largest Bank ASO		$197,985,854	$398,734,011	101.40 %

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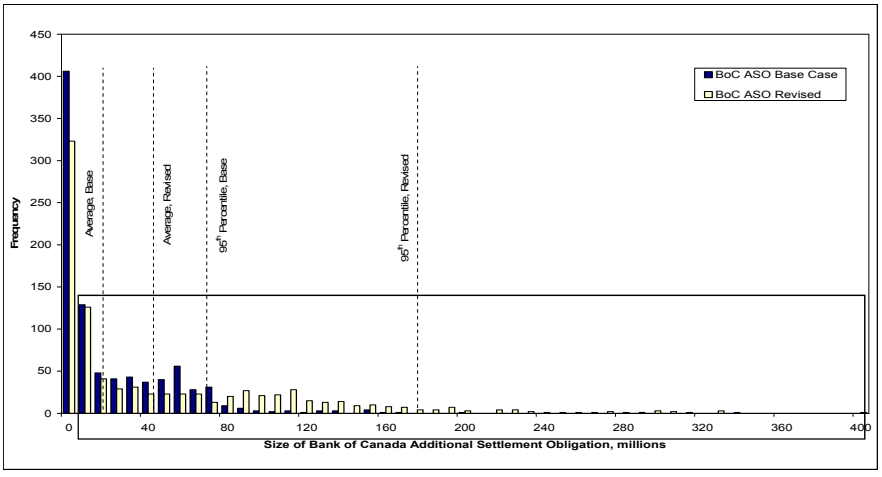
Results – Credit Risk

Distribution of Bank ASO (including Bank ASO = 0)



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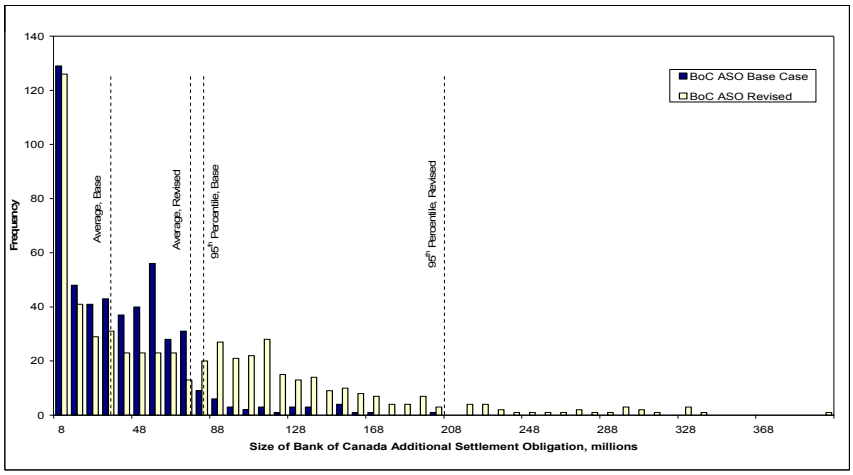
Results – Credit Risk

Distribution of Bank ASO (excluding Bank ASO = 0)



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Results – Credit Risk

Higher probability of private sector survivors facing ASOs after default

If private sector survivors do face ASOs, then on average they are higher

Single largest ASO faced by each private sector survivor is on avg higher

Measure of Credit Risk		Base Case	Revised Case	Growth
Percent of Defaults Resulting in Private Sector ASO		54.69 %	64.17 %	17.35 %
Average Private Sector ASO	Including Private Sector ASOs = 0	$28,658,194	$34,345,847	19.85%
	Excluding Private Sector ASOs = 0	$52,403,555	$53,706,595	2.49%
Single Largest ASO (Private Sector Avg)		$335,817,656	$349,519,845	4.08%

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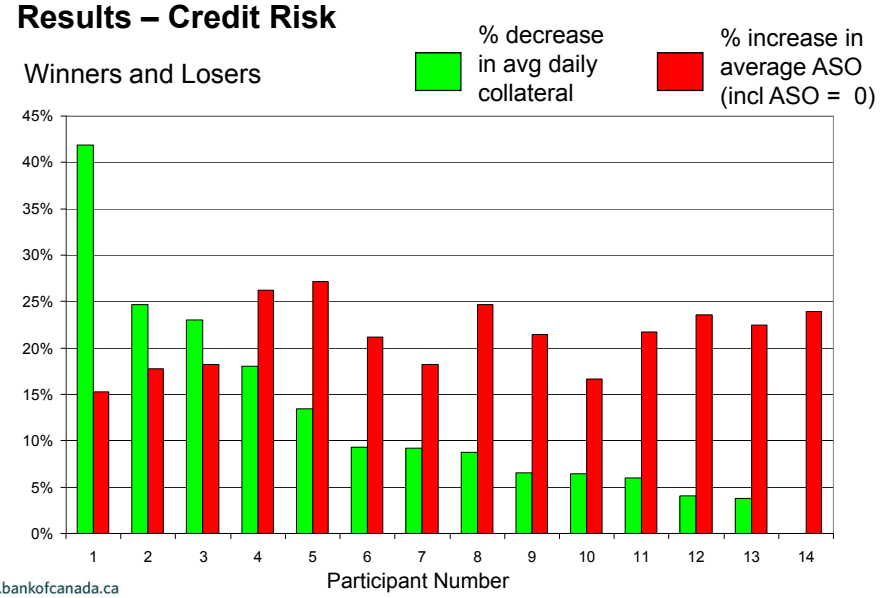
Results – Credit Risk



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Conclusion

Simulations show:

- Significant collateral savings for system as whole
  - But tempered by some increased delay
- Increased credit risk to the Bank
  - But increased risk appears to be manageable
- Some increased credit risk to private sector participants
- Uneven distribution of gains and losses to private sector participants

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Conclusion

Next steps:

- Because of uneven distribution of gains and losses, simulation results will be presented to private sector participants for their review
- However, presentation of results put on hold while Bank evaluates changes to LVTS collateral eligibility policy

Although decision on hold, simulator shown to be useful tool for helping make policy decision.

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