Operational Disruptions: The Impact of System Design

Jenny Hancock
Prepared with Ashwin Clarke
Reserve Bank of Australia

Overview

1. Objectives
2. Australia's RTGS system
3. Methodology
4. Results
   a. Reaction time
   b. Participant size
5. Conclusions

Objectives

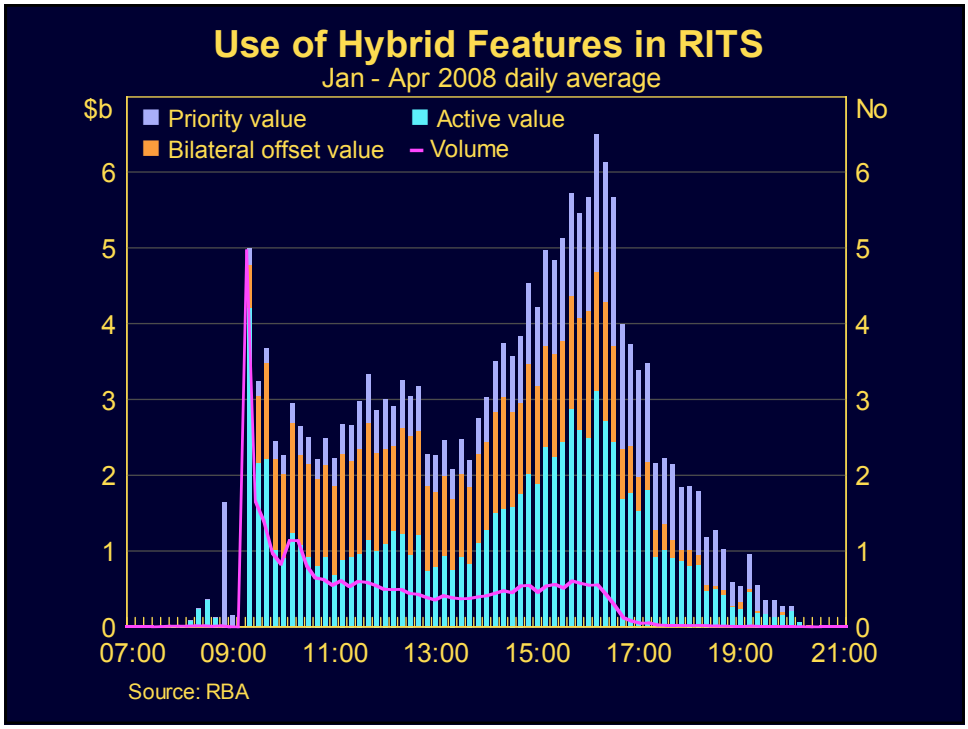
Analyse the effect of system design on the systemic impact of participant operational disruptions

Interaction of system design with:

- Participant reaction time
- Participant size

Australia's RTGS system

- Reserve Bank Information and Transfer System (RITS)
- Hybrid features
  - Central queue
  - Bilateral offset algorithm
  - Sub-limits

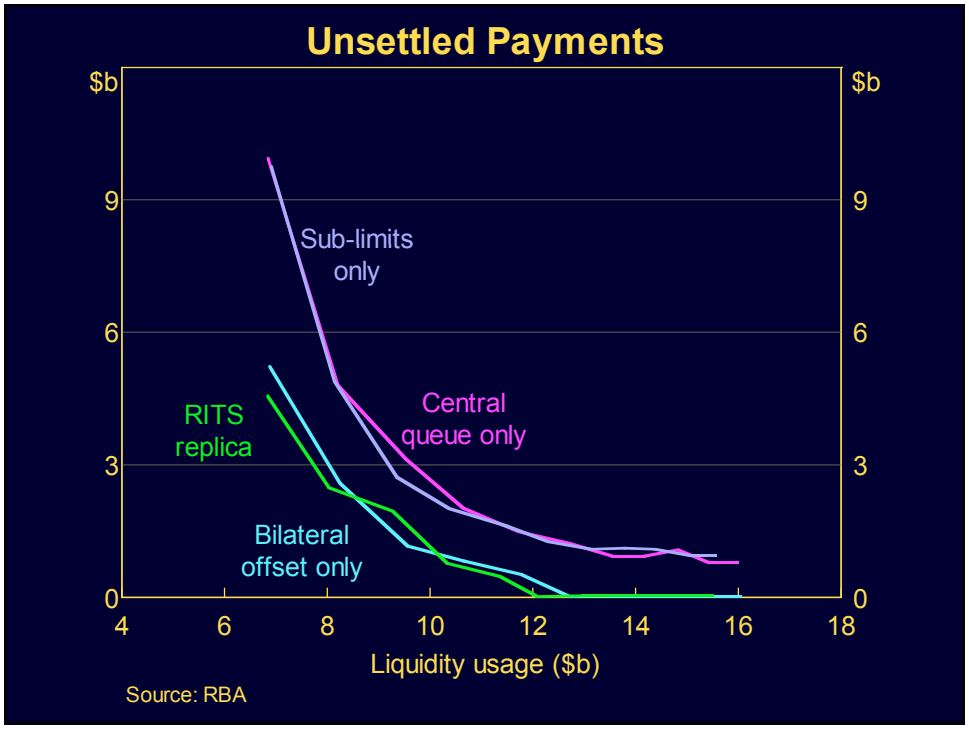


Methodology

- Data
  - 10 days
  - January 2008
- Measures
  - Unsettled payments
    - Excluding payments to or from stricken participant
  - Settlement delays
  - Liquidity sink

System Designs

	Central queue	Bilateral offset	Sub-limits
Pure RTGS			
Central queue only	X		
Bilateral offset only	X	X	
Sub-limits only	X		X
RITS replica	x	X	x

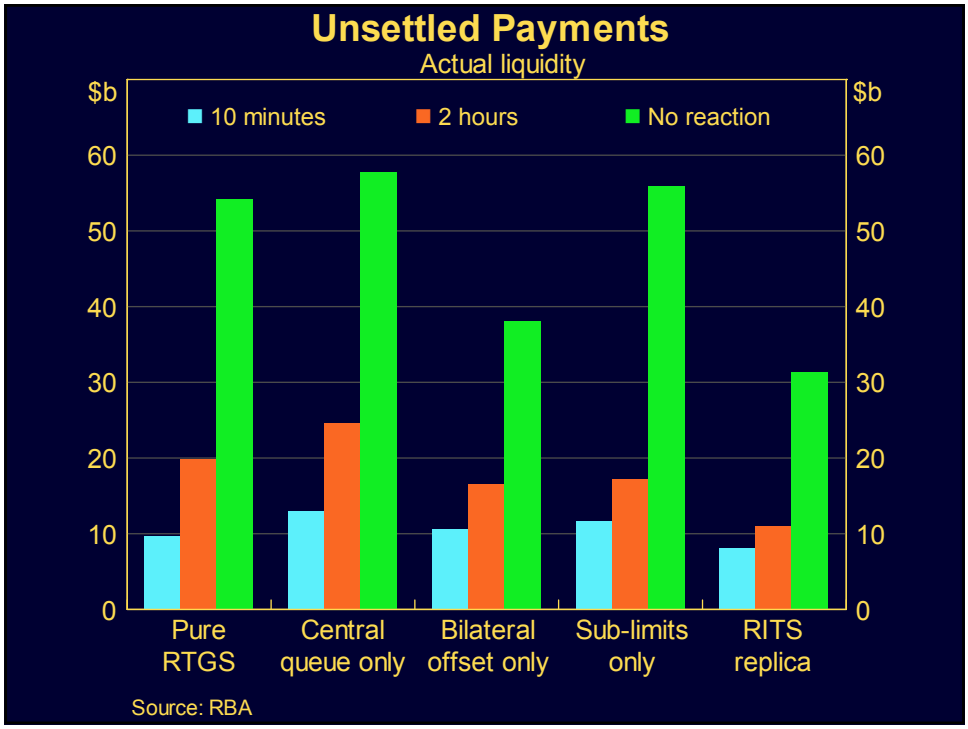


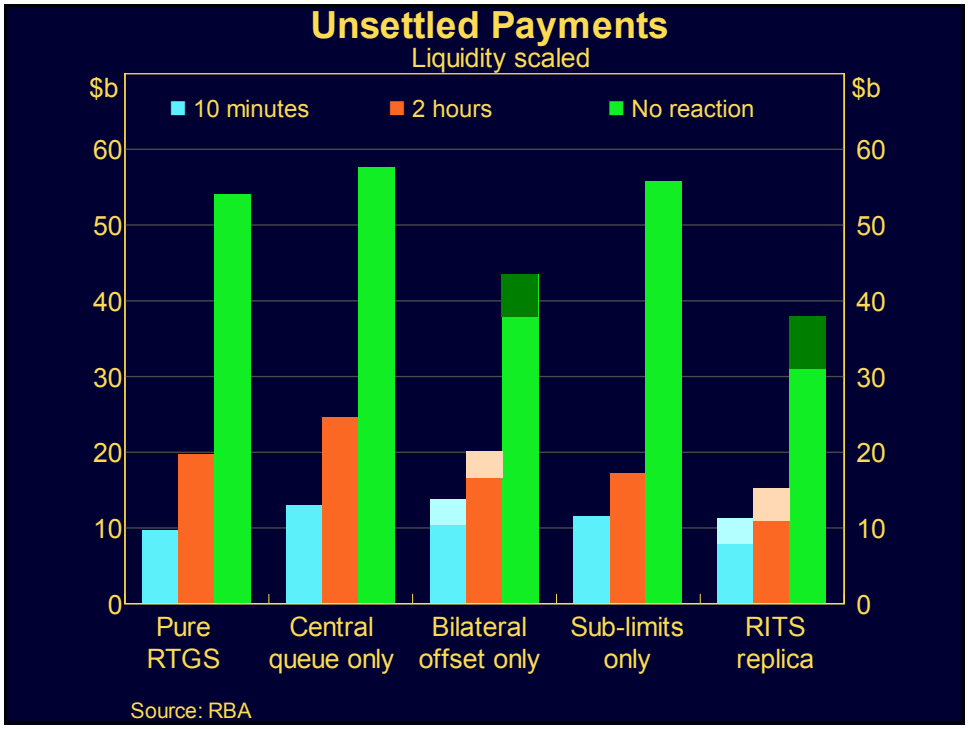
Assumptions

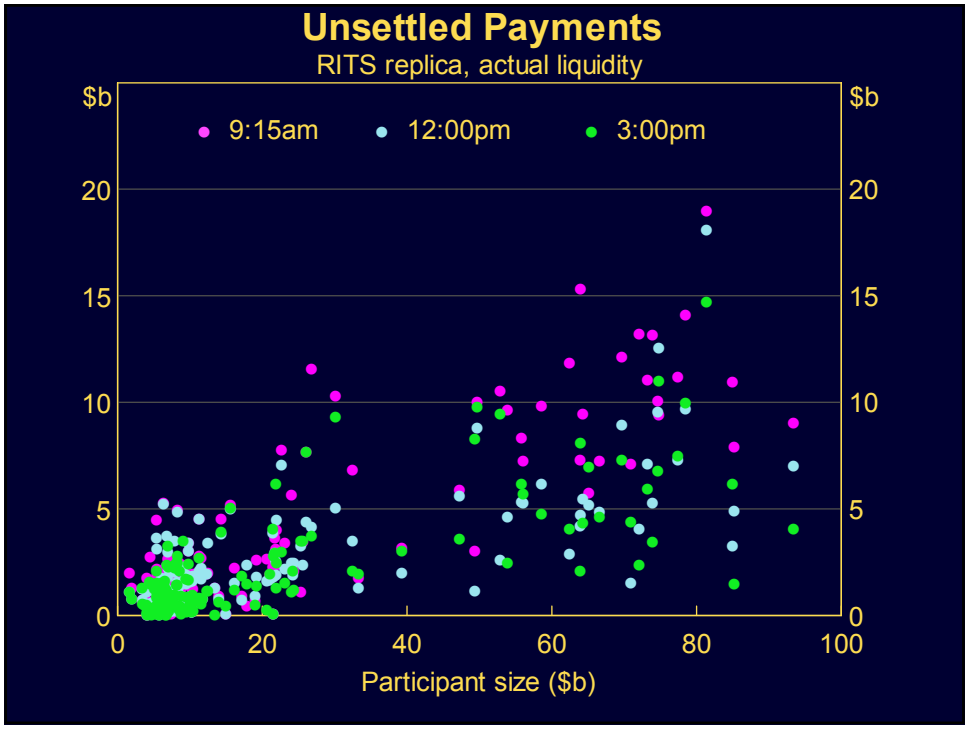
- Liquidity
  - Actual liquidity
  - Scaled liquidity
    - 30% reduction for systems with bilateral offset
- Sub-limits
  - Actual
    - Lower to zero at end of day
  - Participant reaction – lower to zero
- Submission times
  - Actual for central queue systems
  - Pure RTGS – adjust to model coordination

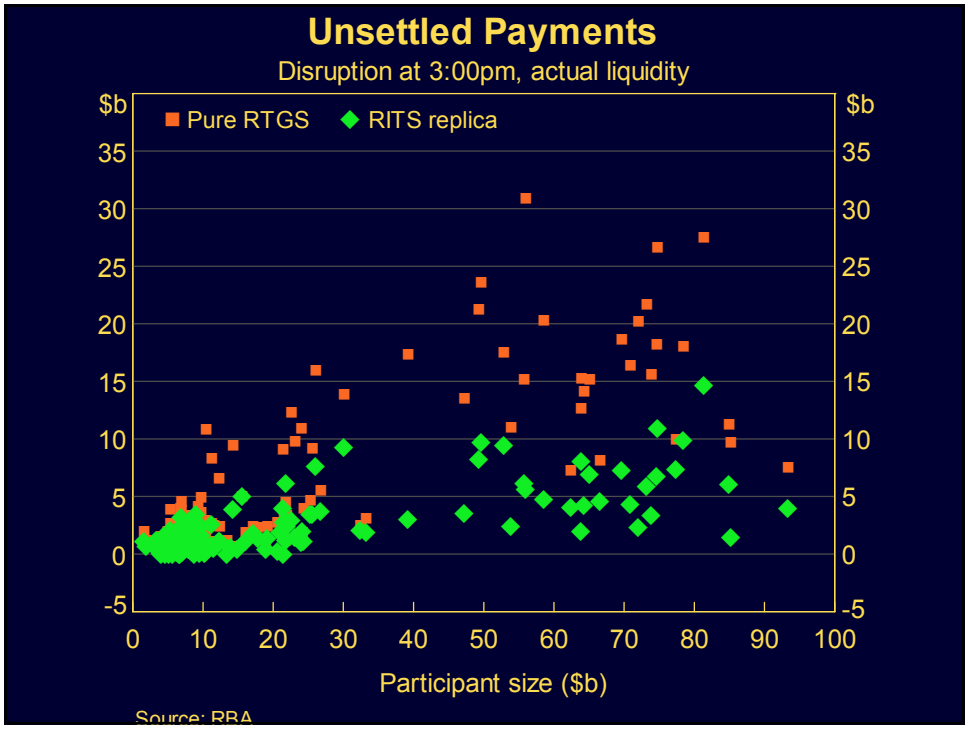
Simulations

	Reaction time	Participant size
Stricken participant	Largest theoretical liquidity sink	Largest 15 banks
Time of disruption		9:15am 12pm 3pm
Reaction time	10 min 2 hours No reaction	2 hours
Liquidity assumption	Actual Scaled	Actual


Unsettled Payments
Actual liquidity
$b
10 minutes
2 hours
No reaction
60
50
40
30
20
10
0
Pure RTGS
Central queue only
Bilateral offset only
Sub-limits only
RITS replica
Source: RBA


Unsettled Payments
Liquidity scaled
$b
10 minutes
2 hours
No reaction
60
50
40
30
20
10
0
Pure RTGS
Central queue only
Bilateral offset only
Sub-limits only
RITS replica
Source: RBA


Unsettled Payments
RITS replica, actual liquidity
$b
9:15am
12:00pm
3:00pm
20
15
10
5
0
0
20
40
60
80
100
Participant size ($b)


Unsettled Payments
Disruption at 3:00pm, actual liquidity
$b
Pure RTGS
RITS replica
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Participant size ($b)
Source: RBA

Conclusions

- Bilateral offset with sub-limits most effective
- Bilateral offset effective, but can be negated by reduction in liquidity holdings
- Sub-limits effective for shorter reaction times
- Hybrid features flatten the relationship between participant size and systemic impact
- Individual participant behaviour is important