

Real Time Gross Settlement and Hybrid Payment Systems: A Comparison

Discussion at the Economics of Payments Conference

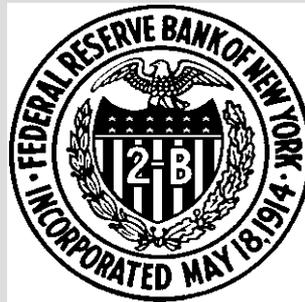
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A Comparison of Intraday Liquidity Management Models

	Angelini (1998)	Kobayakawa (1997)	Bech and Garratt (2003)	Bech and Garratt (200?)	Willison (200?)	
Periods	2	2	2	2	2	☹️
# of banks	2	2	2	n	n	😊😊
Collateral	No	Yes (Fixed)	Yes (Flexible)	No	Yes (Semi flex)	☹️
Priced Credit	Yes	Yes	Yes	Yes	No	☹️
Payment Flow	Stochastic	Stochastic	Stochastic	Common knowledge	Common knowledge	☹️
Uncertainty	Fundamental	Fundamental	Fundamental and strategic	Strategic	Fundamental (Time criticality)	😊
Money Market	Yes	No	Yes	No	No Sustainability	☹️
Risk Appetite	Risk Neutral	Risk Neutral	Risk Aversion	Risk Neutral	Risk Neutral	☹️
Key Result	Incentive to delay	Delaying and not delaying possible eqm.	Prisoner's Dilemma Stag Hunt	Payment coordination → Too Big to Fail	Offsetting ⇒ welfare ↑	😊



Modeling Issues

- Is it a Bayesian Game?
 - Incomplete information → game of imperfect information. Each player receives a private signal
 - Strategies = decision rules = $f(\text{private signal})$
 - Payoff is not a function of private signal
 - Joint distribution of signals is independent
- Aggregation Game
 - it suffices to keep track of some aggregate measure of the strategies played and not the individual strategies



Intraday Liquidity Management Game

RTGS

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	C, C	2C, D
	Afternoon	D, 2C	C+D, C+D

$C < D$

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	<u>2</u> , <u>2</u>	<u>4</u> , 3
	Afternoon	3, <u>4</u>	5, 5

Total cost = 4

$C > D$

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	3, 3	6, <u>2</u>
	Afternoon	<u>2</u> , 6	<u>5</u> , <u>5</u>

Prisoner's Dilemma

Total cost = 10



Intraday Liquidity Management Game

H1: Offset in the afternoon only

		Bank B		
		Morning	Afternoon	
Bank A	Morning	C, C	2C, D	$C < D$ $C > D$
	Afternoon	D, 2C	D, D	

No cost of collateral in the afternoon

The implication for welfare is not clear as in Willison (200?) (if $C < D$)

STAG HUNT!

		Bank B	
		Morning	Afternoon
Bank A	Morning	<u>2</u> , <u>2</u>	4, 3
	Afternoon	3, 4	<u>3</u> , <u>3</u>

Total cost = 4 or 6

No PD!

		Bank B	
		Morning	Afternoon
Bank A	Morning	3, 3	6, <u>2</u>
	Afternoon	<u>2</u> , 6	<u>2</u> , <u>2</u>

Total cost = 4



Intraday Liquidity Management Game

H2: Offset in the morning only

Bank B

	Morning	Afternoon
Bank A Morning	0, 0	2C, D
Bank A Afternoon	D, 2C	C+D, C+D

$C < D$ (indicated by an orange arrow pointing to the top-right cell)

 $C > D$ (indicated by an orange arrow pointing to the bottom-right cell)

No cost of collateral in the morning

Bank B

	Morning	Afternoon
Bank A Morning	<u>0</u> , <u>0</u>	<u>4</u> , 3
Bank A Afternoon	3, <u>4</u>	5, 5

First Best (indicated by a green arrow pointing to the top-right cell)

Total cost = 0

Bank B

	Morning	Afternoon
Bank A Morning	<u>0</u> , <u>0</u>	6, 2
Bank A Afternoon	2, 6	<u>5</u> , <u>5</u>

Game of common interest (indicated by a green arrow pointing to the bottom-right cell)

Total cost = 0 or (10)

Willison (200?): The first best is attained under H2



Intraday Liquidity Management Game

H3: Offset in the morning & afternoon

Bank A

	Bank B	Morning	Afternoon
Bank A	Morning	0, 0	2C, D
Bank A	Afternoon	D, 2C	D, D

$C < D$

$C > D$

Bank B

	Bank B	Morning	Afternoon
Bank A	Morning	<u>0</u> , <u>0</u>	4, 3
Bank A	Afternoon	3, 4	<u>3</u> , <u>3</u>

Total cost = 0 or (6)

Game of common interest

Bank B

	Bank B	Morning	Afternoon
Bank A	Morning	<u>0</u> , <u>0</u>	6, 2
Bank A	Afternoon	2, 6	<u>2</u> , <u>2</u>

Total cost = 0 or 4

Stag Hunt

No cost of collateral in the morning and afternoon



Intraday Liquidity Management Game

H4: Priced Credit

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	0, 0	F, D
	Afternoon	D, F	D, D

$F < D$

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	<u>0</u> , <u>0</u>	<u>3</u> , 4
	Afternoon	4, <u>3</u>	4, 4

Total cost = 0 (FIRST BEST)

$F > D$

Bank A

		Bank B	
		Morning	Afternoon
Bank A	Morning	<u>0</u> , <u>0</u>	4, 3
	Afternoon	3, 4	<u>3</u> , <u>3</u>

Total cost = 0 or (6)

Stag Hunt

Fee F charged by central bank for overdrafts



Occam's Razor

