

Impact of Operating an RTGS System Without Intraday Overdraft Limit

Ali Alhomidan



Data:	Used softwares	Role
<ul style="list-style-type: none"> • Sources: SARIE live payment day • Magnitude: Data for one actual day • Data period: 4th July 2010 	SARIE system	Capture of live data
	PC basic settlement system model	Process the live data again but with interbank limits set to 75%, 50%, 25% and Zero

Keys to Success:
We built a PC system to simulate the settlement process. We stripped out any validation routines as these had already been used when the data was processed in the live environment and so were not necessary for the reduced limits simulation

Workflow of the analysis or key process:

1. Data from live system for 4th July 2010 copied to tape
2. PC simulation system set up to reflect live system but with Interbank limits set to Zero
3. Data from 4th July re-input to simulation system
4. Analysis of results produced for presentation
5. Examine simulation results to prepare Conclusions

Major Challenges:

- There were no major challenges

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Payment and Settlement System Simulation Seminar
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Bank of Finland

Ali Alhomidan
Saudi Arabian Monetary Agency

Agenda

- **Overview**
 - SARIE Payment System
- **Overdraft limits in SARIE**
- **Simulation**
 - Purpose
 - Motivation
 - Simulation tool
- **Simulation Exercise**
 - Data
 - Results of the Experiment
- **Conclusions**

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SARIE

Saudi Arabian Riyal Inter-bank Express (SARIE) is an electronic Real-Time Gross Settlement (RTGS) funds transfer system that allows for the high speed, risk limited, 24-hour, real time gross settlement of single and bulk payment transactions within the national banking community in the Kingdom of Saudi Arabia.



“SARIE went live on 14 May 1997”

SARIE

- Participants: all banks within Saudi Arabia (local & foreign) including SAMA:



- Saudi Riyal only (multi currency capabilities)
- Irrevocable payments
- Forward value payments (14 days)
- Fully collateralized intra-day overdraft limits
- Operating at near 24 hour availability
- High/Low value payments
- Bulk credit and debit payments
- 24 clearing houses
- Real-time monitoring of positions, limits, and payments
- Messages based on S.W.I.F.T. standards
- Expandable via banks to corporate (cash management, electronic commerce).

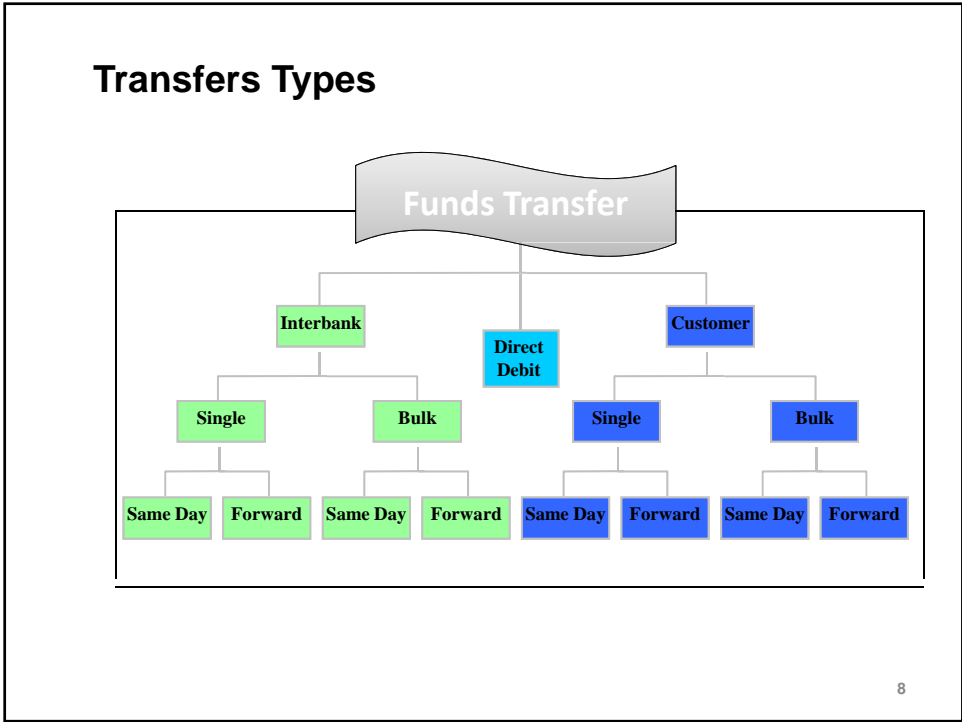
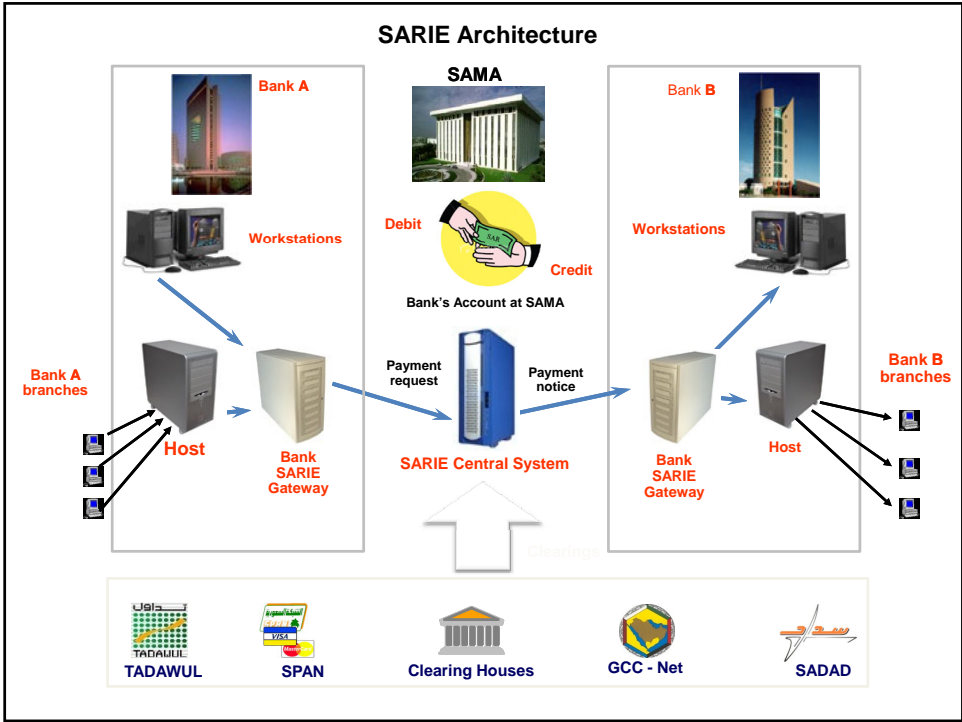
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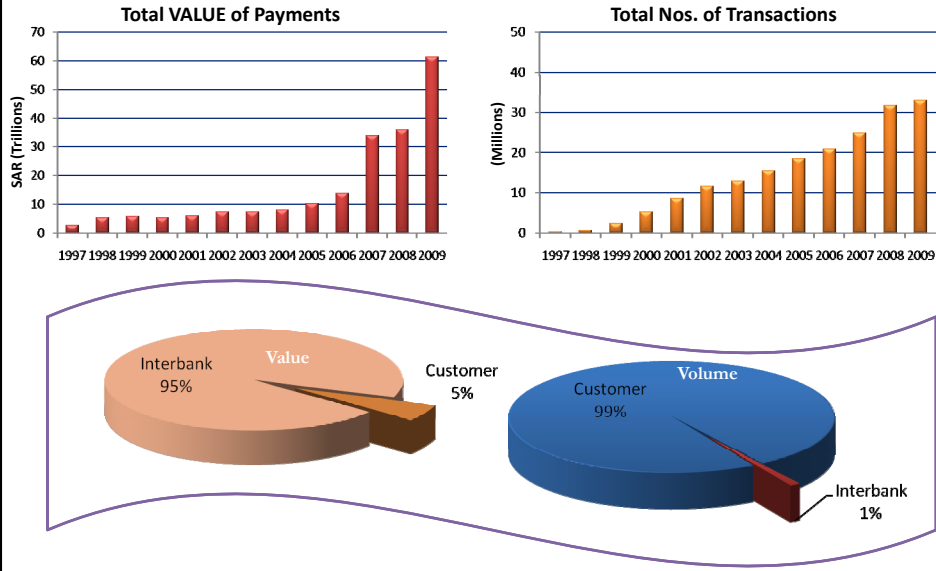
Daily Business cycle

Event #	Start	End	Event
1	9:00	16:00	Cutover
			Same Day Value Transfers
2	9:00	15:00	Clearing
3	9:00	15:30	All types of payments
4	15:30	15:45	Squaring & Positions Adjustment
5	16:00		Cutoff

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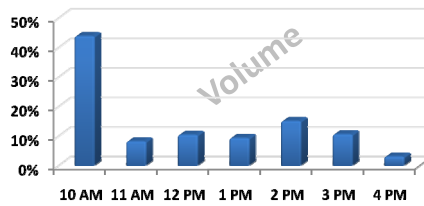
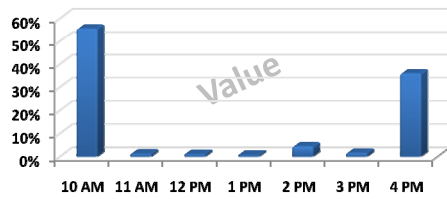


SARIE at a Glance



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Volume and Value Percentage / hr. Processed by SAIRE for One Day 4/7/2010



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Liquidity in SARIE

- Participants must ensure that they have sufficient “available funds” to meet all their payment obligation
- Banks responsible for managing own liquidity
- Incentives to send payments early – pricing policy
- Sources of liquidity:
 - Received payments
 - Intra-day Limits
 - Repos
 - Money Market loans
 - FX Deals
 - Buy & Sell Government Securities
 - Cancel payments
- SARIE has a *Gridlock Resolution* feature that enables SAMA to resolve any gridlock situations. This is triggered manually.

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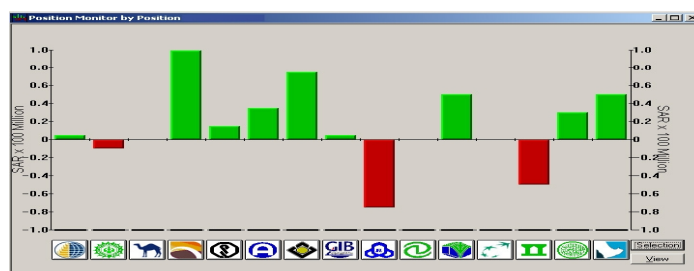
Alternatives to Improve “SARIE” Liquidity

- Scheduling of payments
- Settlement methods for repo and collaterals replacement
- Price incentives - lower charge for payments sent early
- Penalties for held and delayed payments (if held for more than 30 minutes)
- Lending against Securities
- Straight through processing “STP”
- Multiple settlements of other clearings during the day
- Queuing techniques – First In First Out (FIFO)
- System robustness , reliable and faster communications channels and wider bandwidth

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Liquidity management tools

- Available to SAMA :
 - View payment queues
 - Change priorities
 - Gridlock resolution
 - Cancel payments
- Available to banks :
 - Scheduler
 - Monitor and manage queues
 - Set and change priorities
 - Cancel held payments



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Overdraft limits in SARIE System

Collateral policy

- For banks to avail of intra-day limits, they must lodge collateral with SAMA – typically in the form of purchased government bonds
 - Acceptable types of collateral specified in SAMA Collateral Policy
- SAMA use this collateral to set the intra-day limit
- Banks can increase their intra-day limit by lodging additional collateral with SAMA (subject to SAMA approval)
- SAMA monitors banks current accounts to ensure that the position doesn't exceed their limit – automatic function in SARIE
- Transactions which would breach a bank's intra-day limit are held until that bank has sufficient "available funds"

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Simulation Exercise

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Overview

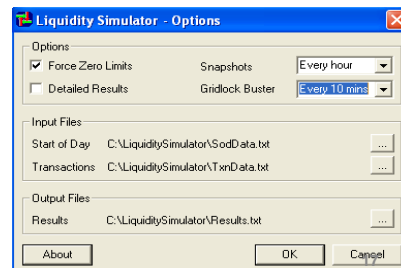
- **The simulation**
 - Examine the potential impact of reducing intra-day limits
 - Analyze and optimize
 - Understanding the system capabilities and functions
 - Prediction of behavior
 - Ready for unexpected liquidity situation
- **Motivation**
 - Current collateral might be required for other purposes at some stage in the future
 - Conducting good business planning
 - Readiness to reduce the level of intra-day limit in the future
 - Test impact of future market, financial or liquidity changes
 - System development and user requirements!

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Simulation Exercise

Simulation tool (Liquidity Simulator)

- New function implemented by SAMA that can be used to analyze the impact of changing the limits and/or using gridlock busting techniques in the SARIE system.
- The Simulator incorporates a powerful Automatic Gridlock Buster based on the algorithm proposed by *Morten L. Bech* and *Kimmo Soramaki* in their 2001 paper for the Bank of Finland entitled "Gridlock Resolution in Interbank Payment Systems".
- This tool provides us with statistical information such as: held payment, maximum and average waiting time in held queue, average time value .



Simulation Exercise

Set up

- Use one day's actual payments - live system - with real limits and opening balances
- Run the same payments through the "Liquidity Simulator" with limits reduced to:
 - 25% - 50% - 75%
 - Zero limits for all banks
- Analyze the impact on held queue (value and volume)
- Analyze impacts on Participants business and liquidity management

Simulation Experiments

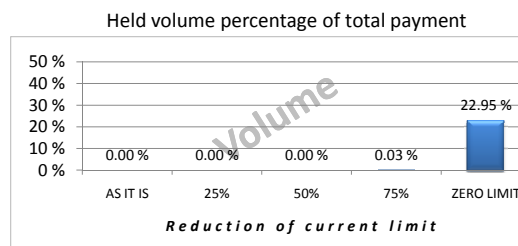
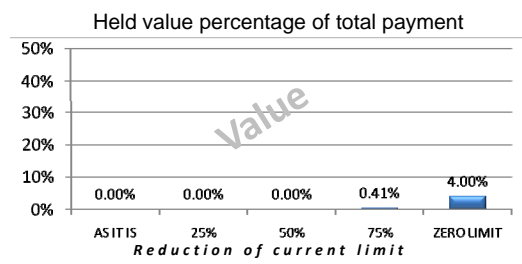
Data

- Simulation was conducted with data from SARIE System (LIVE Environment) as:
 - I. Start-of-Day File
 - II. Transaction Files
- The Start-of-Day File contains the following data for each participant:
<Participant-ID>,<limit>,<starting balance>
for example:
BJAZ,5000,20000
- The Transaction File contains the following data for each transaction:
<HH:MM:SS time>,<txn type><UTI>,<from PID>,<to PID>,<amount>
for example:
09:10:00,BIPAY,UTI0001,BJAZ,BMUS,10000

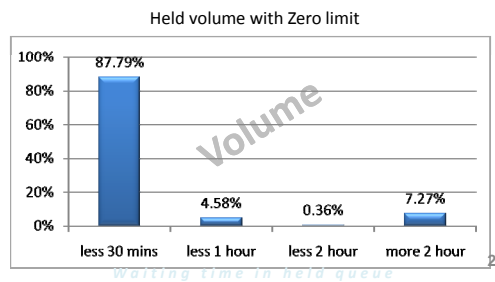
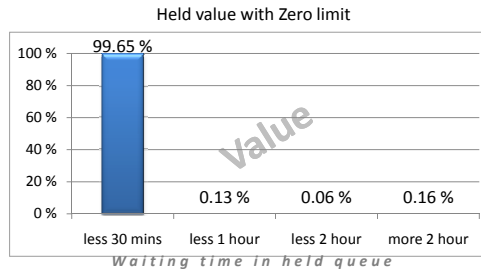
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Simulation Experiments:

Result (Gridlock Buster every 10 minutes)



Simulation Experiments: Result (Gridlock Buster every 10 minutes)



Conclusions

- Intra-day limits could be reduced with very little negative impact on the flow of payments.
 - The key reason for this is the existing policy of SAMA to encourage banks to send payments as early as possible
 - Payment flow management system
- The spike in the value of payments processed between 3 and 4 p.m. relates to end-of-day Repos etc
 - The Value in that last hour is high but the Volume is quite low
- Further analysis of the results of the experiment can be conducted to identify:
 - Features and functions that could be added to the system to enhance Liquidity management
 - Conduct further simulation tests to ensure the validity of the results – only one day's data used in this simulation exercise

Thank You.

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