Estimating Change in Banks Intraday Liquidity Demand Due to Change in Settlement System

August 2011

Mehrdad Sepahvand
Iran Banking Institute
Central Bank of I.R. Iran

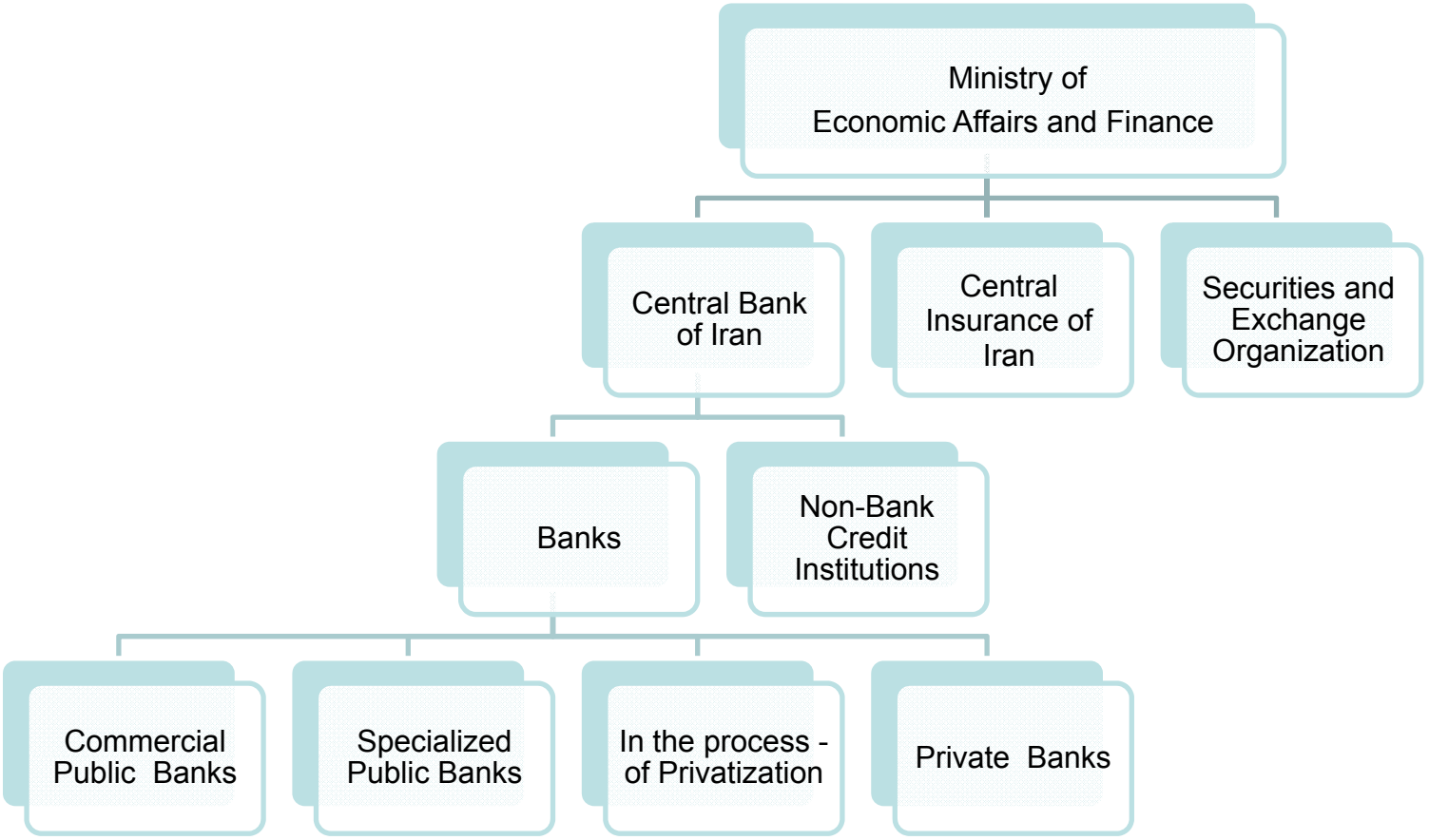
Outline

- Iran's Payment System Before and After 2006
- Research Question and Methodology
- Available Data From the Netting System
- Payment Flow Generating Algorithm
- Estimating Liquidity Needs
- Setting Limits on Payments and CBU Policy
- Conclusion

IRAN A GLANCE

- Population – 74.2 m
  - One Nation, Different Ethnicity: Fars, Turks, Kurds, ..
  - 89% Shia Islam
- An Oil Producer Country
  - Oil production (m barrel/day) ~4
- Inflation (5y Ave; %) 16.46
  - Highest in the reign
- Real GDP Growth (5y Ave;%) 6
- Density:45/km2
- 27 Banks
- 20000 Branches
- SATNA Launched in 2006

IRAN FINANCIAL SYSTEM
Structural Changes in Banking System



- **BMI**
- **Sepah Bank**

- **BIM**
- **Keshavarzi**
- **Tosseh Saderat**
- **Maskan**

- **Tejarat**
- **Mellat**
- **Refah,**
- **Saderat**
- **Post Bank**

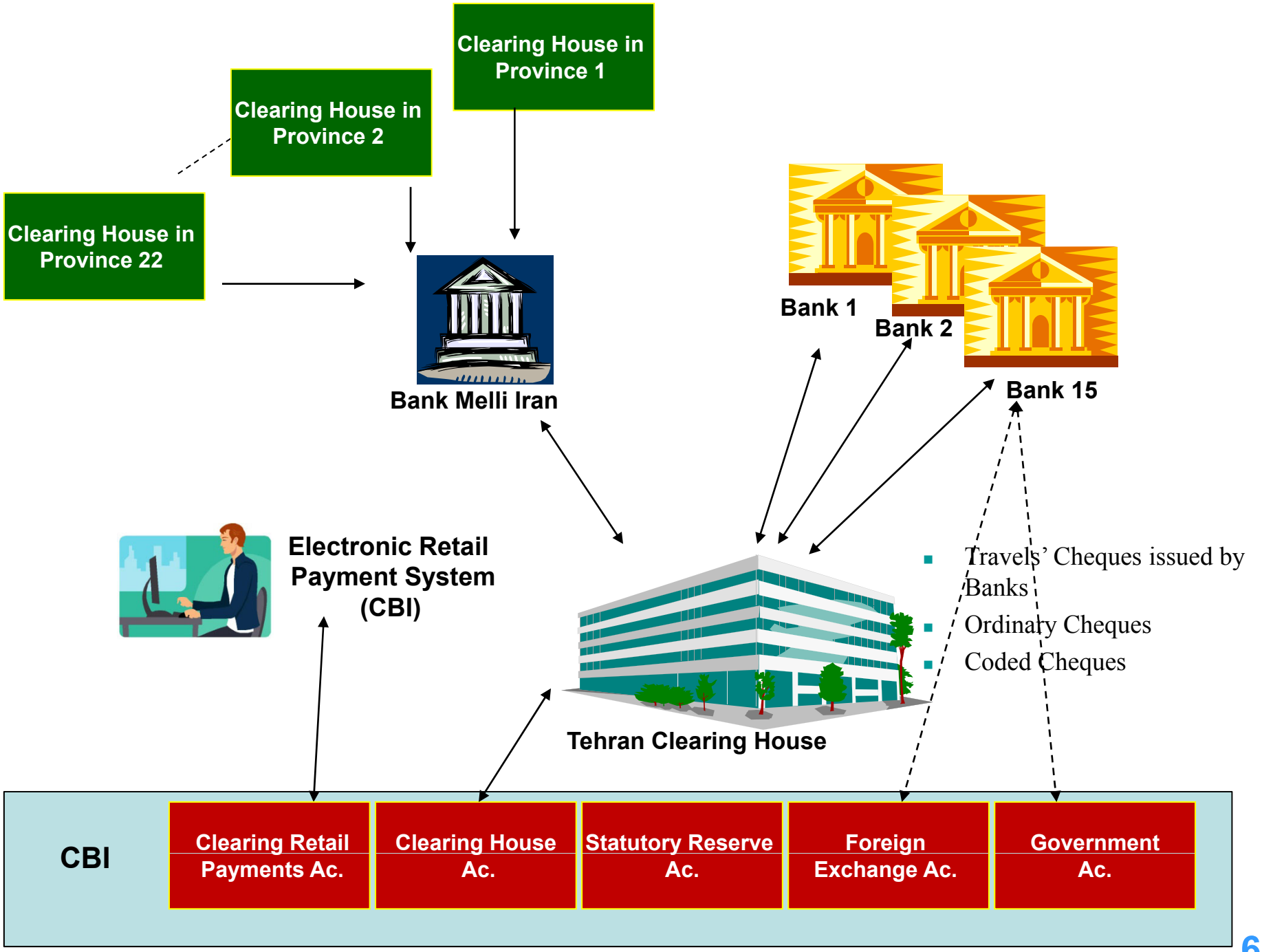
- **Parsian,**
- **EN**
- **Sarmayeh**
- **Karafarin**
- **Sina**

- **Passargad**
- **Tat**
- **Day**
- **Tavon**
- **Ansar**

- **Mehr**
- **Shahr**
- **Aria**
- **Iran Zamin**
- **Gardeshgari**
- **Hekmat Iranian**

Iran Payment System Before 2006

- Decentralized
- Instruments:
  - Cash and Notes
  - Travels' Cheques issued by Banks
  - Ordinary Cheques
  - Coded Cheques
  - Debit Cards
- Settlement Method
  - Multilatral Netting System
- Several Accounts with the CBI


Clearing House in Province 1
Clearing House in Province 2
Clearing House in Province 22
Bank Melli Iran
Bank 1
Bank 2
Bank 15
Electronic Retail Payment System (CBI)
Travels' Cheques issued by Banks
Ordinary Cheques
Coded Cheques
Tehran Clearing House
CBI
Clearing Retail Payments Ac.
Clearing House Ac.
Statutory Reserve Ac.
Foreign Exchange Ac.
Government Ac.

Iran Payment System After 2006

Provinces | Capital

Tehran Clearing House

Retail Payments

Reserve Dep.

Bank

RTGS (SATNA)

Reserve Dep.

Bank

CBI

CBI

Settlement (RTGS) Ac.

Statutory Reserve Ac.

Foreign Exchange Ac.

Government Ac.

Research Question

- How the change in settlement method brought about by adopting Real Time Gross Settlement System will affect the banks liquidity demand?

The Literature

- Theoretical examination of banks' behavior in payment system
  - Angelini 1998,
  - Bech and Garratt, 2003

- Simulation analysis and policy oriented-researches.
  - BoF approach: Volume, number and timing of payment orders are deterministic and derived from a sample of real data.
  - BoE approach: Data are stochastic and vary in a range theoretically imposed

Two Stage Research Process

- At the first stage, a data generator model along with some information on the time distribution of coded cheques over a working day are used in order to produce intraday flow of payments.

- Then the output is fed to the Bank of Finland Payment Settlement Simulator (BoF-PSS) to estimate banks intraday liquidity needs in Satna.

The Model

- Let first denote P_i^I as the payment received and denote P_i^O as the payment ordered by bank i.
- Lower limit:

$$LB_i = \min\{0, (\sum_t P_i^{It} - P_i^{Ot})\}$$

- Upper Limit:

$$UB_i = \min\{0, (\sum_t (P_i^{It} - P_i^{Ot}) \forall t \in [0, T])\}$$

- Liquidity available for each bank at a particular liquidity level is the sum of the lower bound and the corresponding liquidity level multiplied by the difference between the bounds.

$$LL_i = LB_i + s_i (UB_i - LB_i)$$

Data From the Netting System

Table 1: Average daily value and volume of payments in TCH in 2005
(Values in billion Rials)

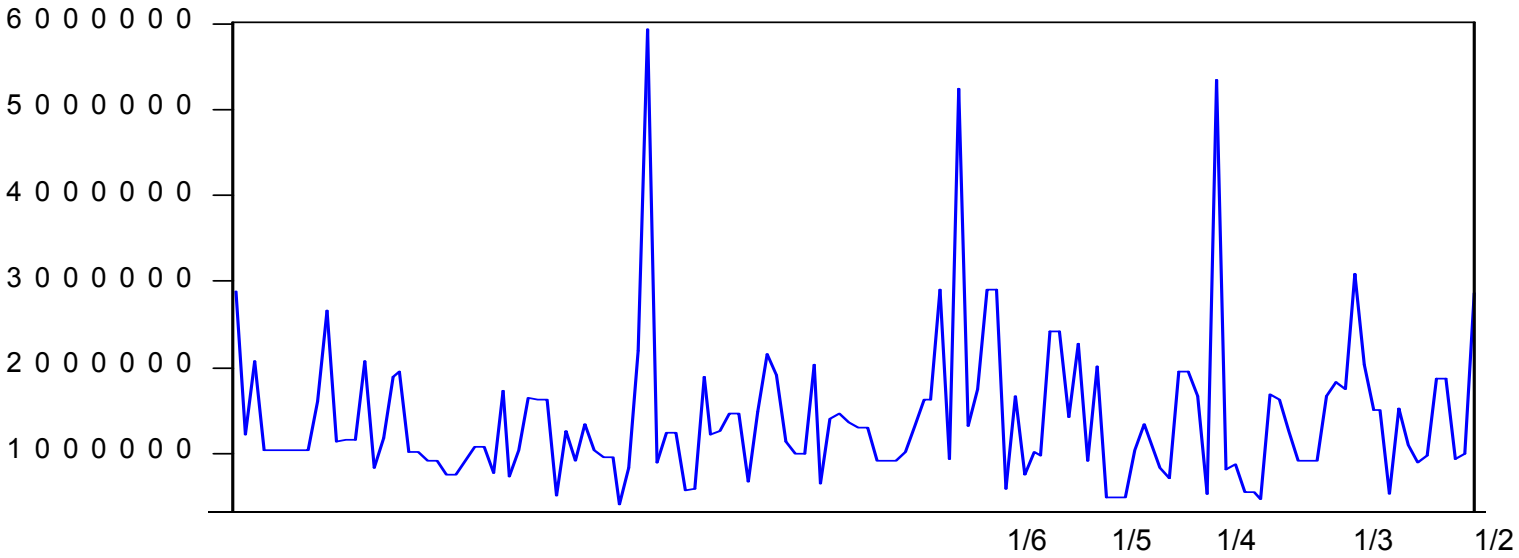
No	Bank	Average Value of Transactions	Average Daily Volume	Share of each Bank in Total Transaction
1	Melli	215129188	10179	**24.3**
2	Saderat	142575200	6825	**10.8**
3	Tejarat	100658930	10168	**13.5**
4	Mellat	303578299	5198	**17.5**
5	Sepah	185033778	5773	**11.9**
6	Refah	163281171	1981	**3.6**
7	Post Bank	188323529	170	**1.1**
8	Maskan	62528561	2626	**1.8**
9	Keshavarzi	150549662	2074	**3.5**
10	BIM*	789297297	74	**0.6**
11	Toseh Saderat	337169173	266	**1.0**
12	Karafarin	327381974	466	**1.7**
13	Saman	308904899	347	**1.2**
14	EN**	456528926	363	**1.8**
15	Parsian	194360731	2628	**5.7**

Tehran Clearing House Data Property

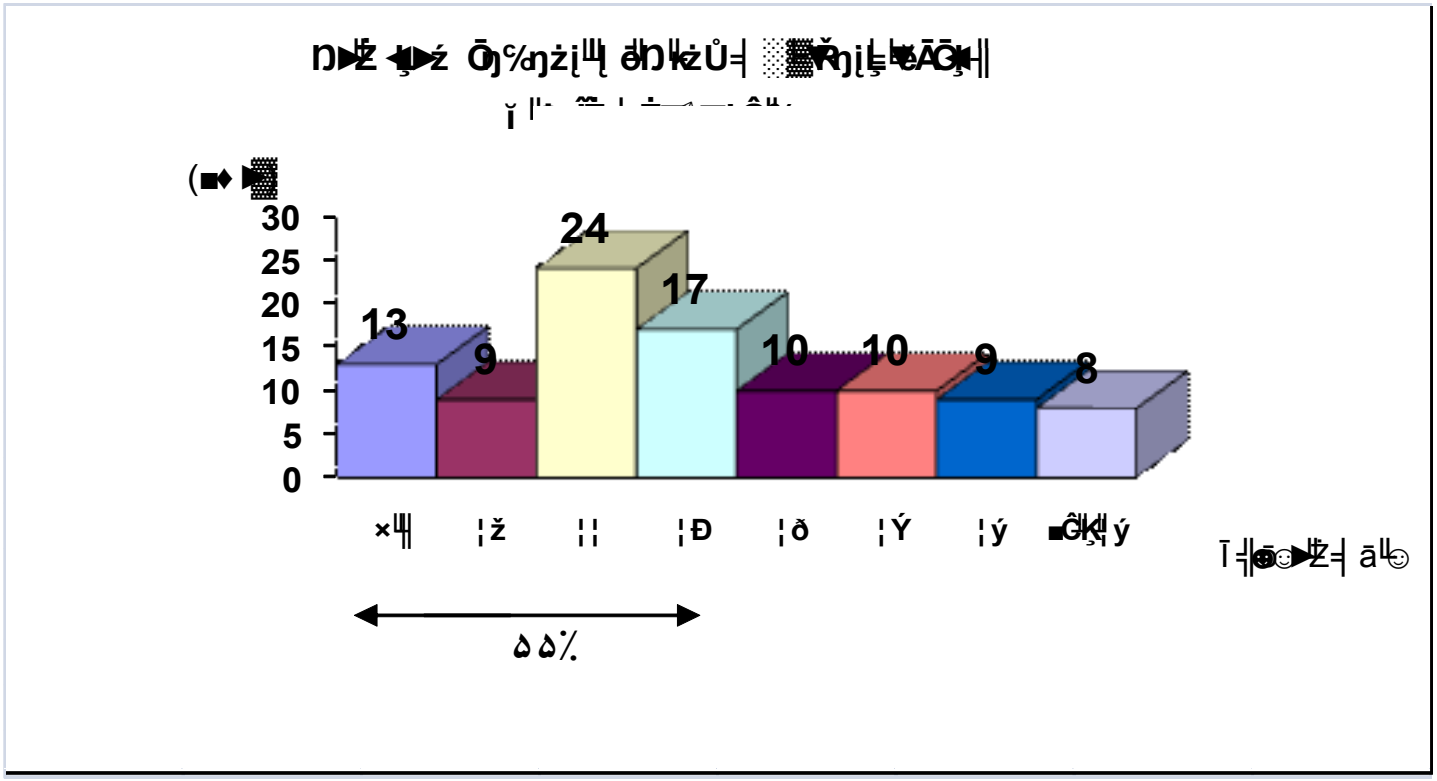
Null Hypothesis: SETTELMENT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=12)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-11.10263	0.0000
Test critical values:	1% level		-3.479281	
	5% level		-2.882910	
	10% level		-2.578244	

*MacKinnon (1996) one-sided p-values.



Time Distribution Of the Coded Cheques



Payment Flow Generating Algorithm

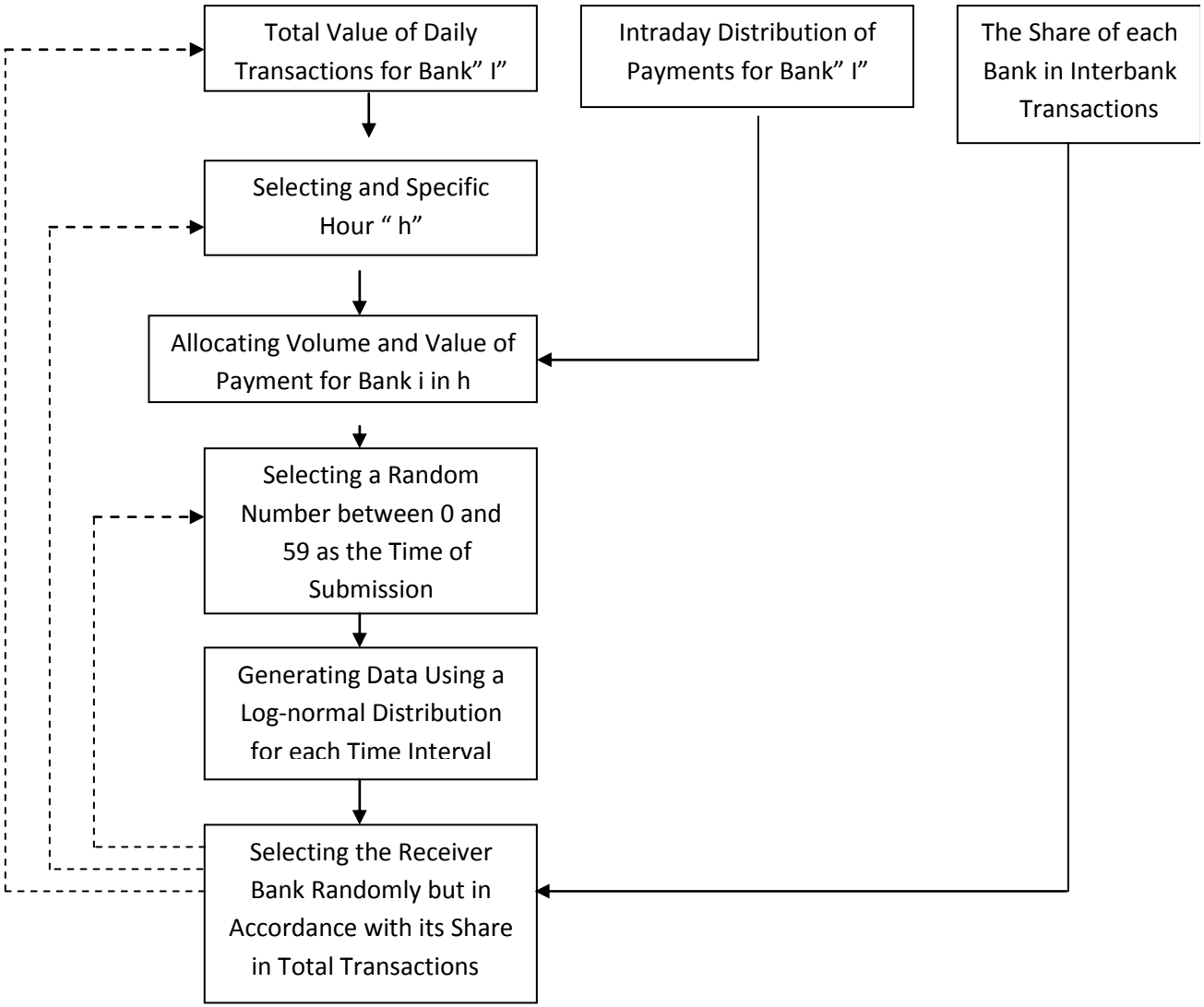
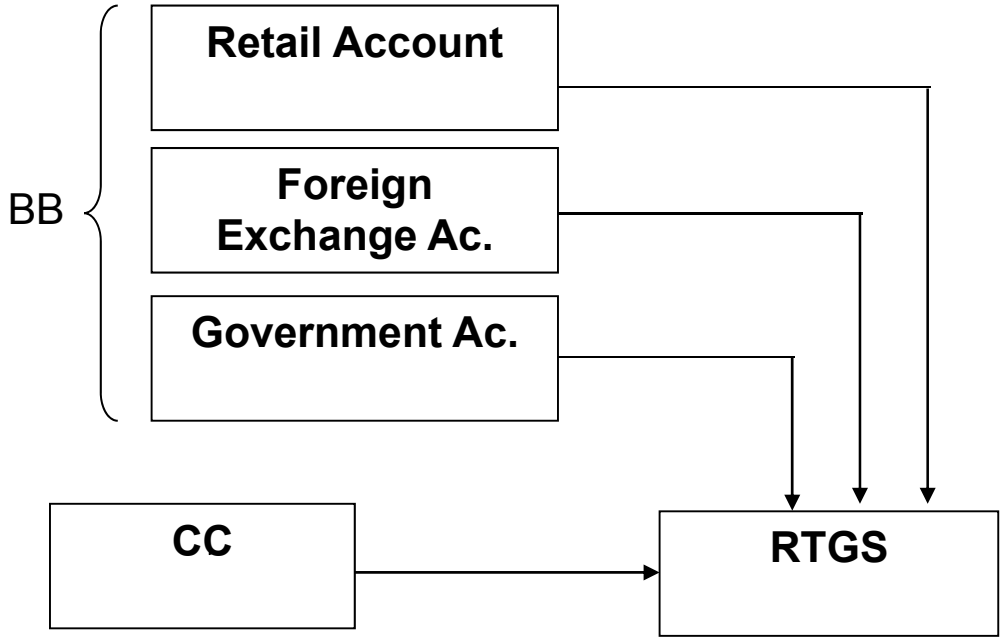


Figure 3

Structure of the Payment Flow



Bank to Bank Transactions and Liqudity

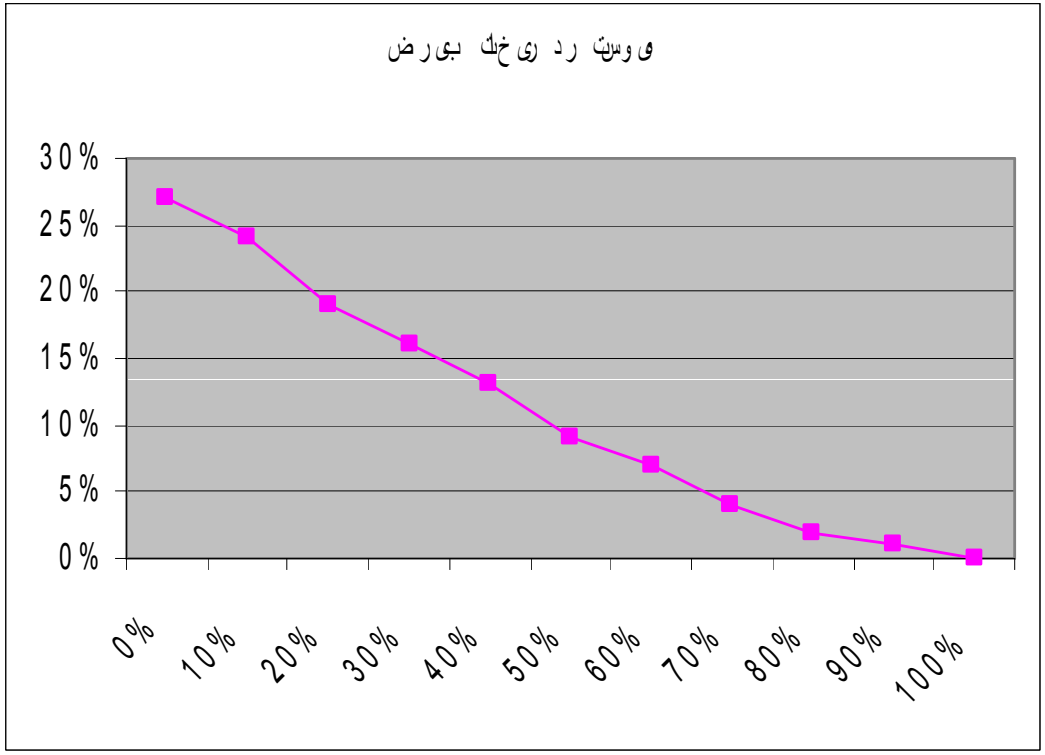
Table 1: Average daily value and volume of payments in TCH in 2005
(Values in billion Rials)

Bank	The Liquidity Buffer		Liquidity
	Average	SD	Needs for
Saderat	70.2	143.6	501
Parsian	9.6	46.3	148
Tejarat	83.9	123.3	454
Melat	57.6	104.7	372
Melli	168.1	215.4	814
EN	4.7	4.8	19
Sepah	69.9	163.6	560
Toseh Sade	180.5	181.2	724
Refah	33.3	46.7	173
Keshavarzi	43.4	64.4	236
Saman	14.7	29.2	102
Maskan	9.9	19.1	67
Other Bank	0.8	1.6	6
BIM	41.5	63.3	231
Karafarin	0.7	5.1	19
Total			4426

Liquidity Needs

Bank	Liquidity Needed for C2C Transactions	Liquidity Needed for B2B Transactions	Lower Bound	Upper Bound
Saderat	2465	501	2222	2966
Parsian	2101	148	1463	2249
Tejarat	2055	454	1472	2509
Melat	1654	372	1420	2026
Melli	1612	814	1351	2426
EN	1948	19	1180	1967
Sepah	1086	560	1038	1646
Toseh Saderat	310	724	607	1034
Refah	658	173	1055	831
Keshavarzi	445	236	503	681
Saman	595	102	412	697
Maskan	546	67	398	613
Other Banks	449	6	273	455
BIM	294	231	309	525
Karafarin	296	19	192	315
Total	16514	4426	13895	20940

Liquidity Needs, Delay and CBI intraday Liquidity Provision Policy



Setting a Limit on Payments

Payments in Million Rials

Liquidity Need	Transaction Volume	Limit
16527	48970	0
16496	43190	10
15988	25934	50
12683	6725	300

Conclusions

- The results indicate the movement towards a real time gross-settlement system increases the liquidity demand of Iranian banks in payment system by about 66 percent.

- If CBI set a limit of 300 million Rls on payments, the liquidity needs of the system decreases by about 23 percent.