

Using Interbank Payments Network to Assess Systemically Important Banks

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Objective

- Main objective: **Assessing Systemic Risk**
- Using the payment systems data that are easily accessed with high frequency
- Assessing the stability of the results of the indicator-based approach



History

- 2007 → Failure of a number of large, global financial institutions
 - Sent shocks through the financial system
 - Harmed the real economy
- 2011 → BCBS adapted a series of reforms to improve the resilience of banks and banking systems
 - Developed an assessment methodology to identify global systemically important banks
- 2012 → BCBS extended the G-SIBs framework to domestic systemically important banks



Benefits

- Why do we need to assess systemically important banks?
 - Regulators point of view:
 - They improve resilience of banks and banking systems through raising the quality and quantity of systemically important banks by imposing Higher Loss Absorbency requirements.
 - Banks point of view:
 - In case of a failure, it is more likely for them to be bailed out by the government.



Methods for Assessing Systemically Important Banks

- Indicator-based approach
 - Basel committee's framework
- Network Analysis
 - Interbank payments network through real-time gross settlement system
- Fuzzy C-Means Clustering (FCM)
 - Clustering data into three groups: 1) very important, 2) important, and 3) marginally important



Data

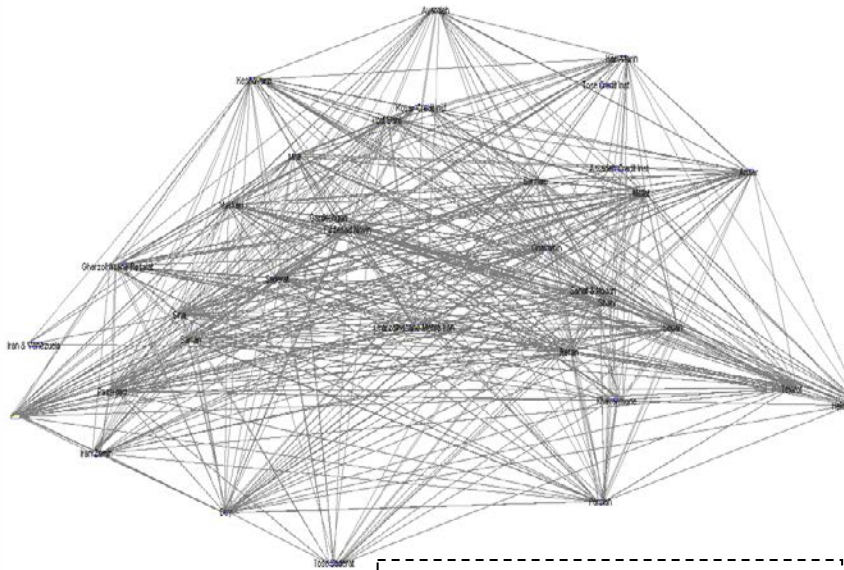
- Data:
 - Indicator-based approach:
 - Number of financial institutions: 31
 - Time period: one year 1391 (2012-2013)
 - Interbank Payments network:
 - Number of financial institutions: 34
 - Time period: one year 1392-1393 (2013-2014)
- Sources:
 - Central Bank of Iran ٔIran Banking Institute
 - Central Bank of Iran ٔDepartment of Payment Systems



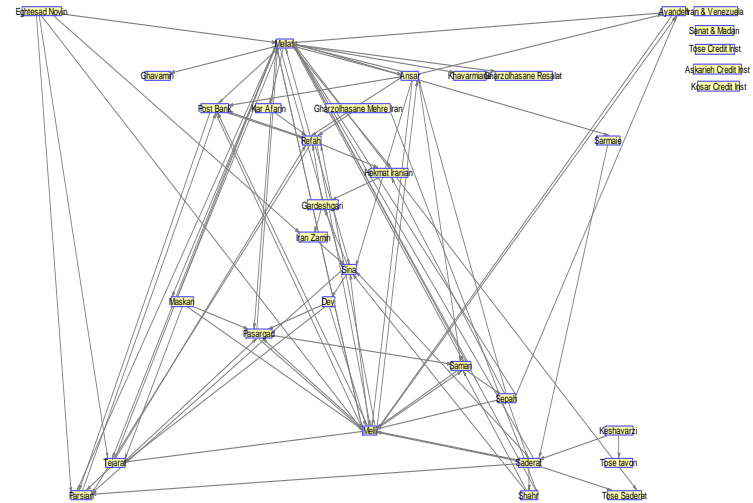
Network Analysis

- Constructing 365 matrices (34×34) of daily mutual transactions in RTGS including B2B and C2C transactions
- Assessing the centrality of each bank using the following measures:
 - Out/in-degree centrality:
 - Number of banks paying to/receiving from
 - Out/in-strength centrality:
 - Total value of paid/received transactions
 - Total number of paid/received transactions
 - Closeness:
 - Shortest distance to other banks

Network Analysis



Transactions in RTGS on 93/7/1
Number of active banks: 34
Number of links: 792

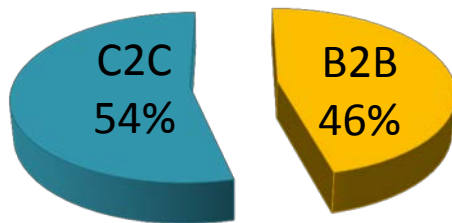


B2B transactions in RTGS on 92/9/28
Number of active banks: 29
Number of links: 95



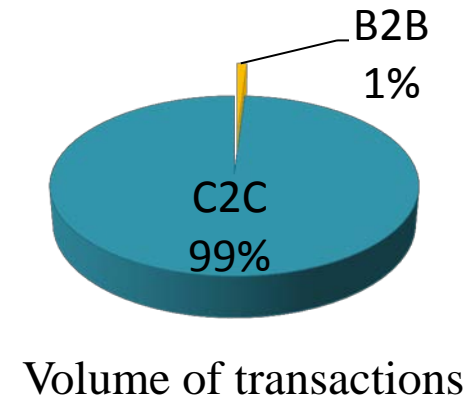
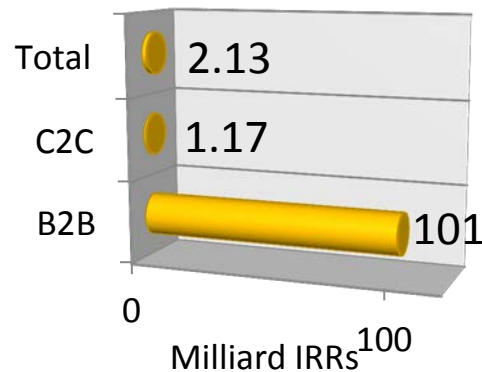
Network Analysis Descriptive Statistics

- Total number of transactions: 5 millions worth more than 11 million milliard IRRs



Value of transactions

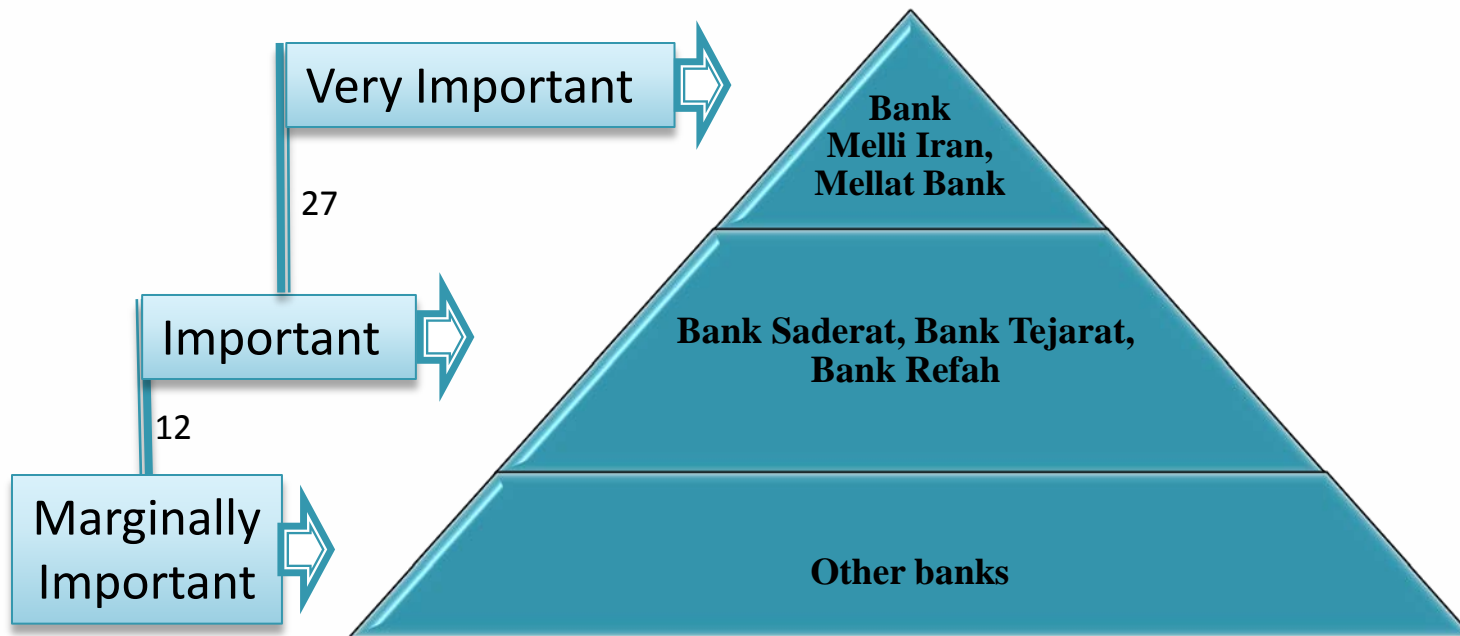
Value per transaction



Volume of transactions



Network Analysis Fuzzy C-Means Clustering





Network Analysis Fuzzy C-Means Clustering

Degree of belonging to clusters

Bank Name	Very Important	Important	Marginally Important
Bank Melli Iran	0.98	0.01	0.01
Mellat Bank	0.97	0.02	0.01
Bank Saderat	0.07	0.77	0.16
Bank Tejarat	0.03	0.90	0.08
Bank Refah	0.02	0.56	0.42

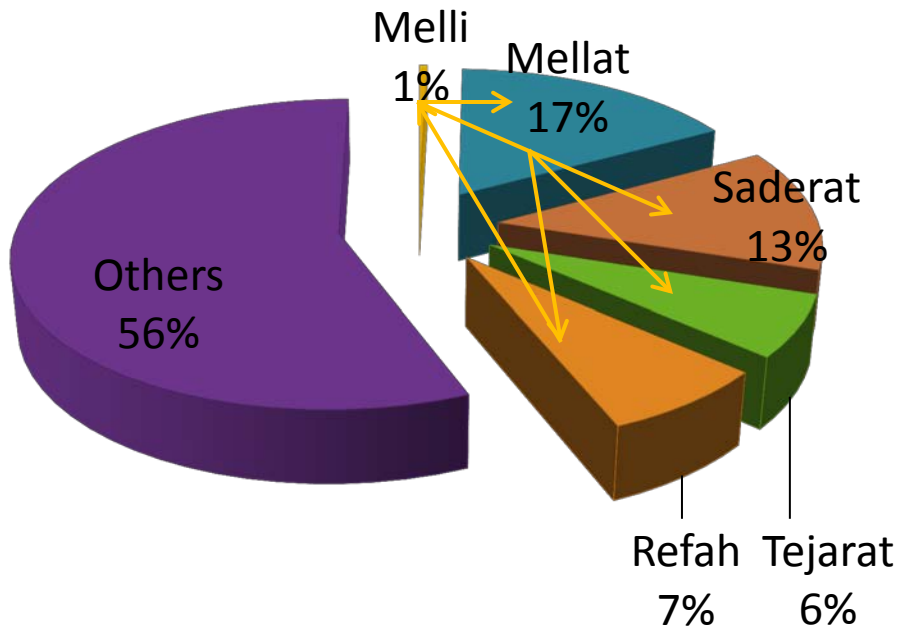
Clustering validation

Null Hypothesis	Mann-Whitney-Utest	P-value
Clustering based on annual data is the same as clustering based on monthly data	106638	0.36*

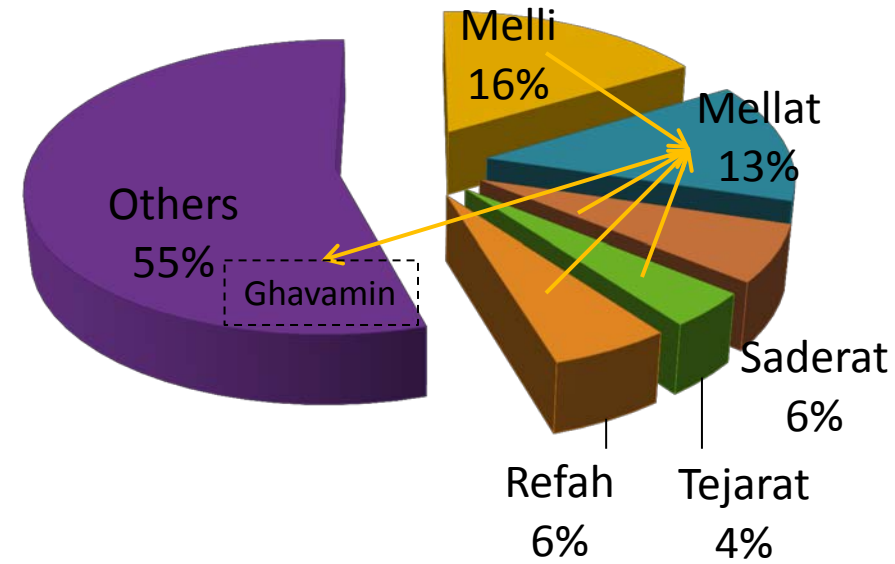
* Not enough evidence to reject the null hypothesis



Network Analysis Bank-to-Bank Transactions



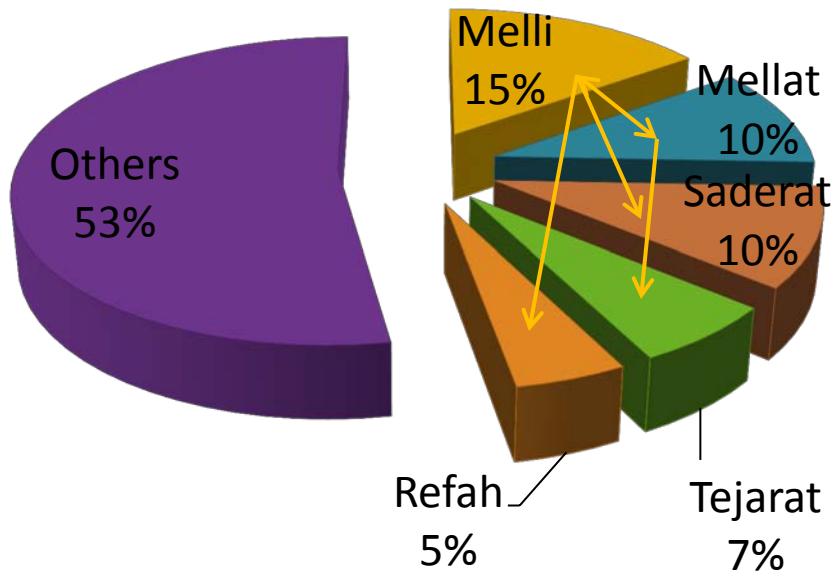
Proportion of incoming transactions (value)



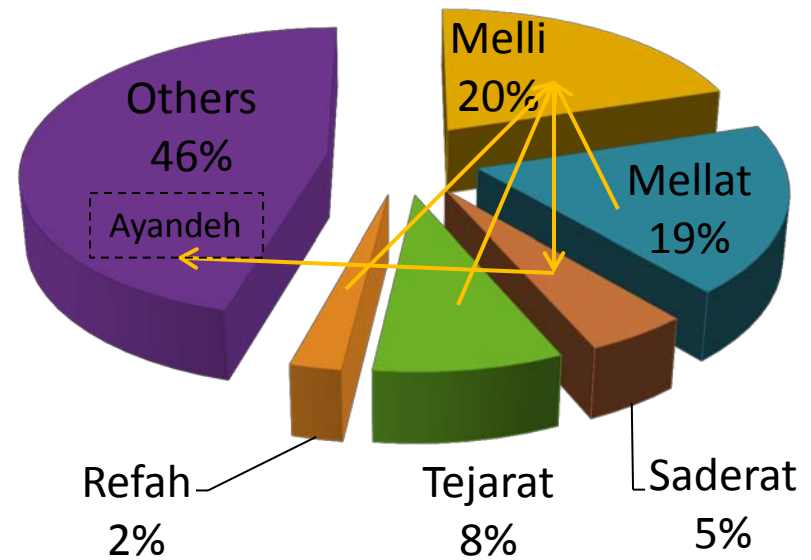
Proportion of outgoing transactions (value)



Network Analysis Customer-to-Customer Transactions



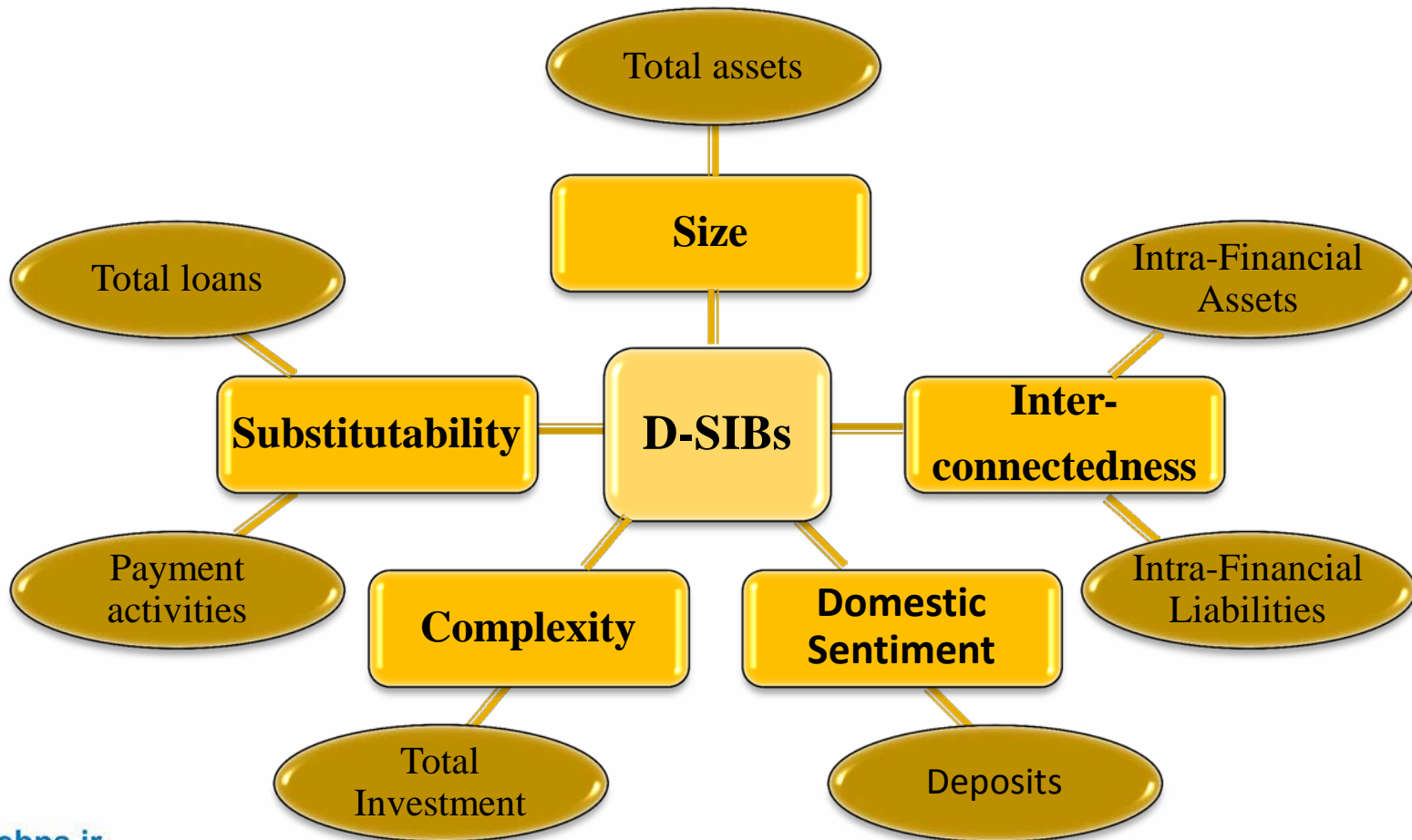
Proportion of incoming transactions (value)



Proportion of outgoing transactions (value)

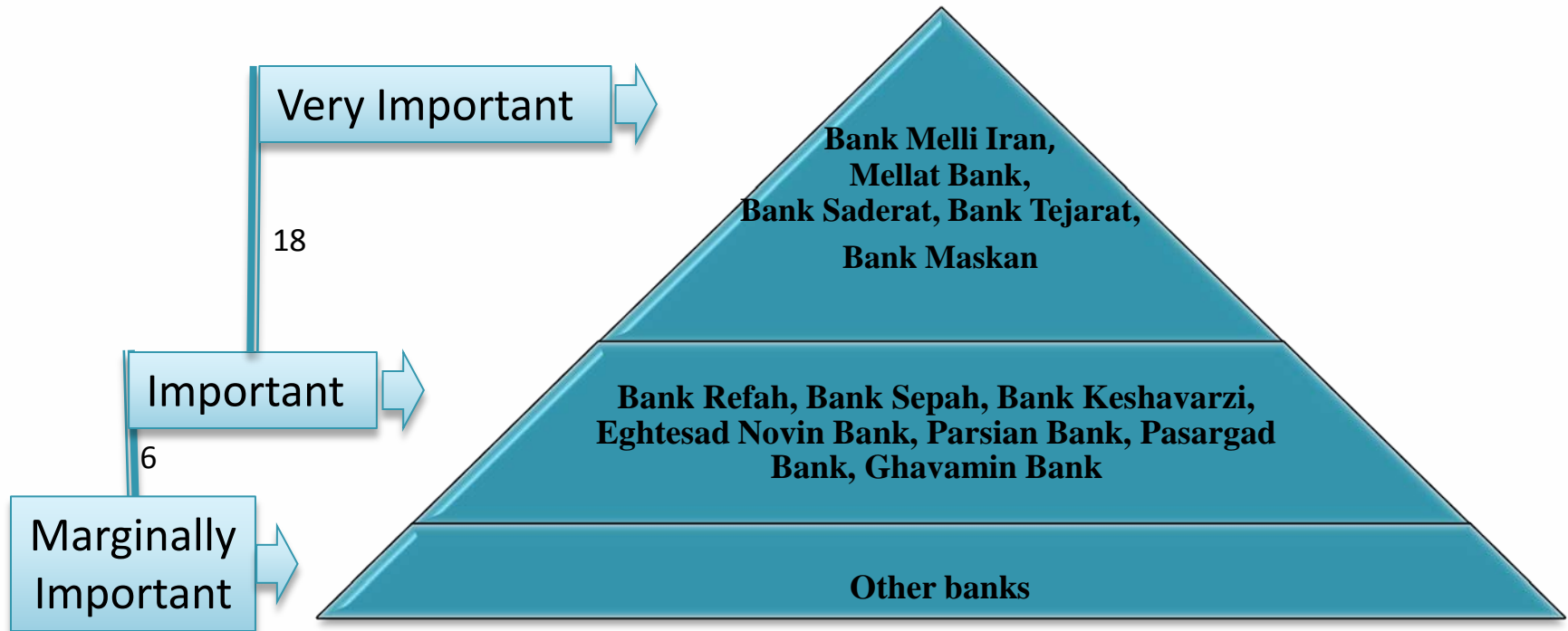


Indicator-Based Approach BCBS Framework





Indicator-Based Approach Fuzzy C-Means Clustering





Indicator-Based Approach Fuzzy C-Means Clustering

Degree of belonging to clusters

Bank Name	Very Important	Important	Marginally Important
Bank Melli Iran	0.88	0.07	0.04
Mellat Bank	0.95	0.03	0.02
Bank Saderat	0.55	0.33	0.12
Bank Tejarat	0.49	0.37	0.14
Bank Maskan	0.57	0.27	0.16

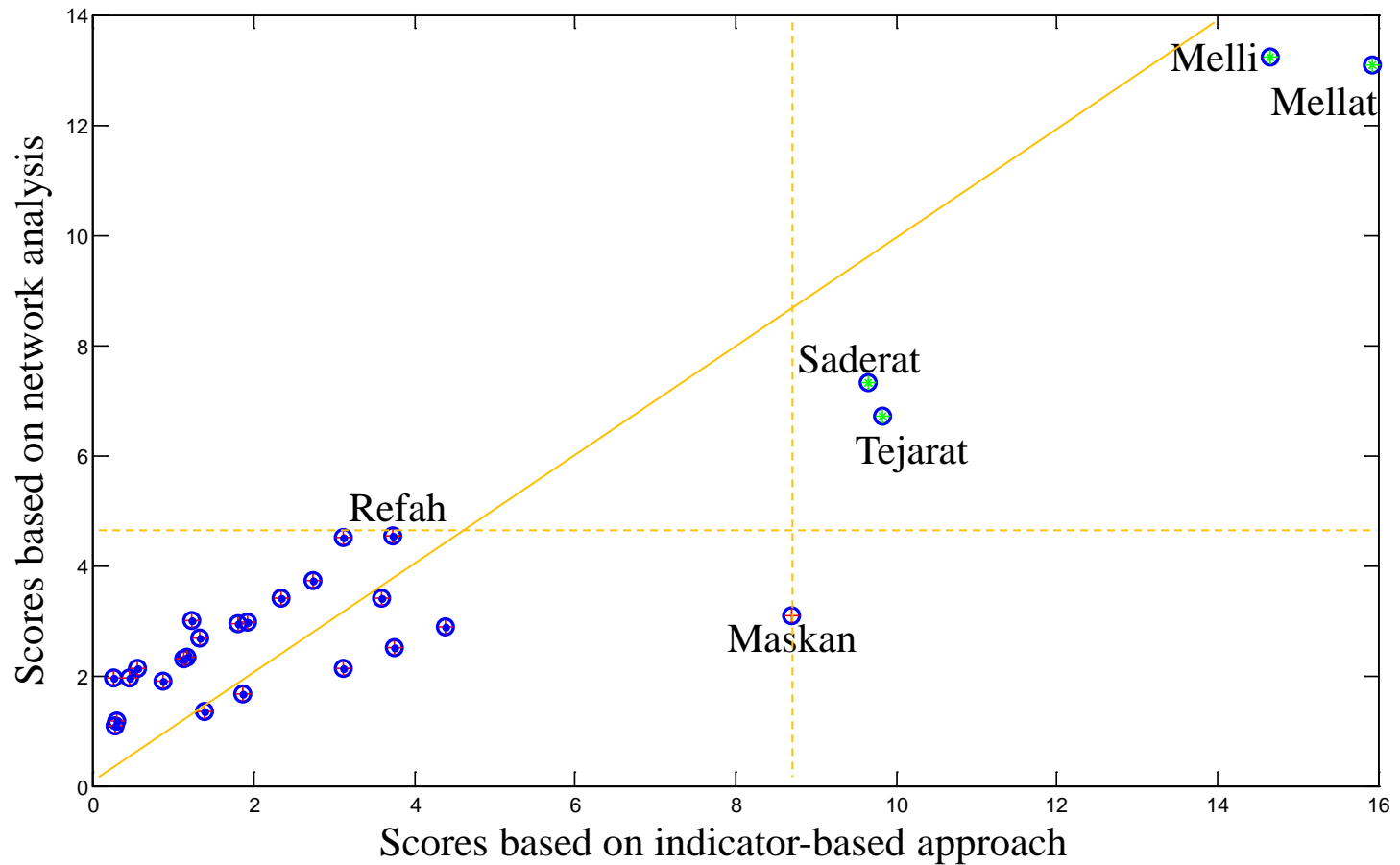


Comparison and Results

- In both methods Banks **Melli** and **Mellat** are considered as the very important banks → they must be treated differently.
- Banks **Tejarat** and **Saderat** are in the second place; in one method they are among important banks and in the other considered as very important → they must be treated differently too.
- Apart from Bank **Refah** with a very low degree of belonging to Important Banks group; we conclude that very important and important banks in payment systems are very important in financial system as well.
- Bank **Maskan** has also a high score in method 2, however it is not considered as systemically important. Its importance is not because of its activity, but because of the government policy in lending mortgage to households, specifically through Maskan Mehr project.



Comparison and Results





Future Work

- Apply more metrics in social network analysis, such as, PageRank and SinkRank in order to assess systemically important banks with more confident.
- Consider different weights for different indicators and compare the results in both methods.



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Thank you