BANKING SYSTEMS UNDER NETWORK THEORY

CASE: VENEZUELA, 1998–2013
(IN PROCESS)

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JUSTIFICATION

- The 2008 financial crisis proved we need new ways to think about systemic risk
  - "Too big to fail" became "Too interconnected to fail"
  - Current regulation stresses the health of the banks, i.e. nodes, but not of the network, i.e. the financial system, as a whole
- Network theory helps expose the effect of connections between banks that can often lead to cascading failures not accounted for by traditional regulations
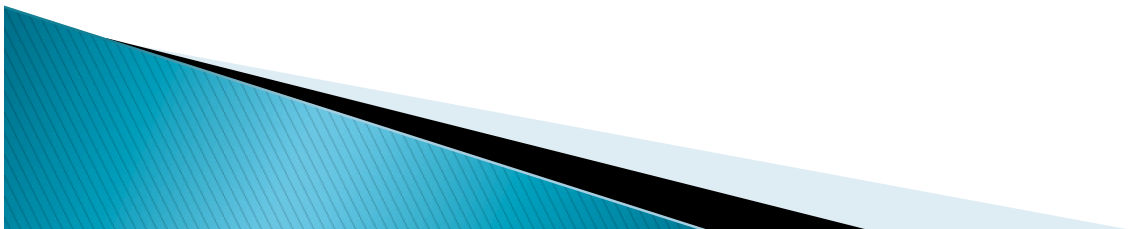
QUESTIONS

‣ Can we predict the next financial crisis?

‣ Can we prevent the next financial crisis?

‣ Can we influence new financial regulations?
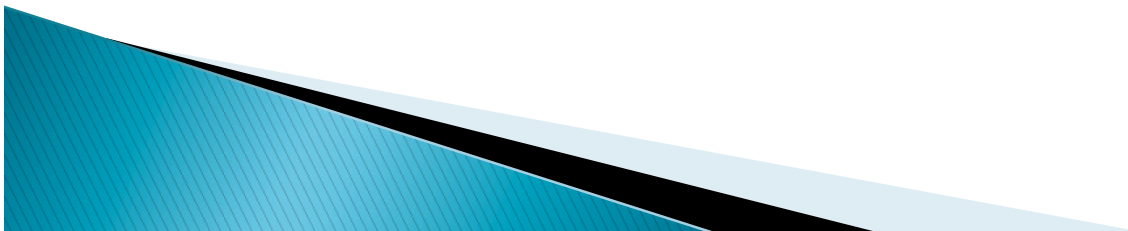
OUR PROJECT

- To describe the topology of the Venezuelan banking system based on Network Theory models
- To explore and show the transformation of the system during the period 1998–2013 and better understand the effects of historical changes to bank laws
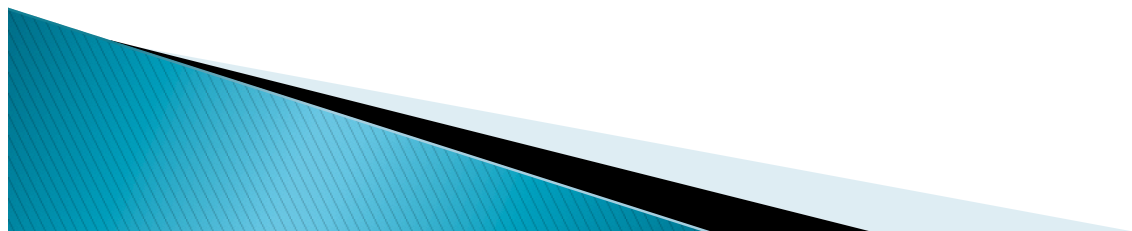- To simulate shock scenarios and evaluate their impacts
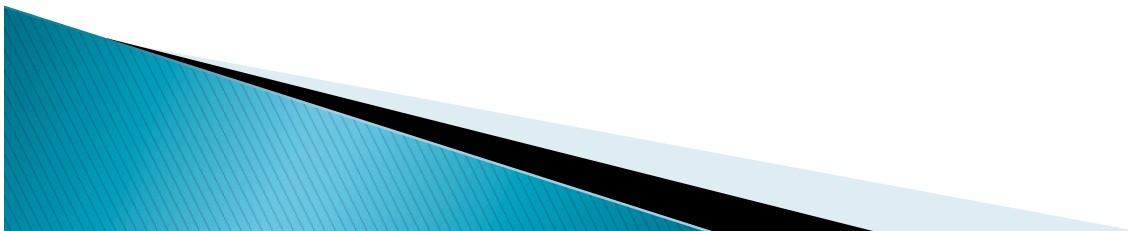
DATA & METHOD

- Data:

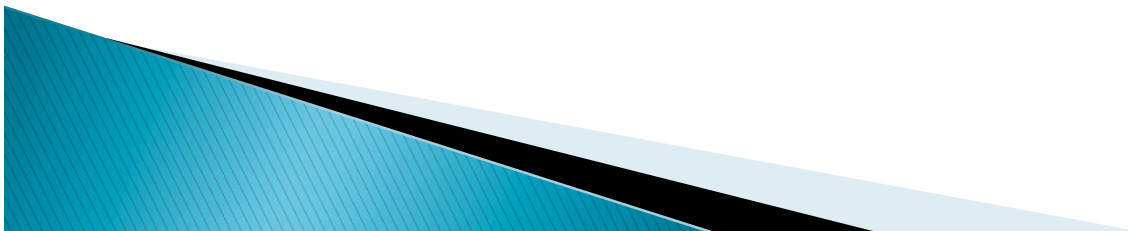Balance Sheet information of each of the institutions of the banking system in monthly basis, from 1998–2013
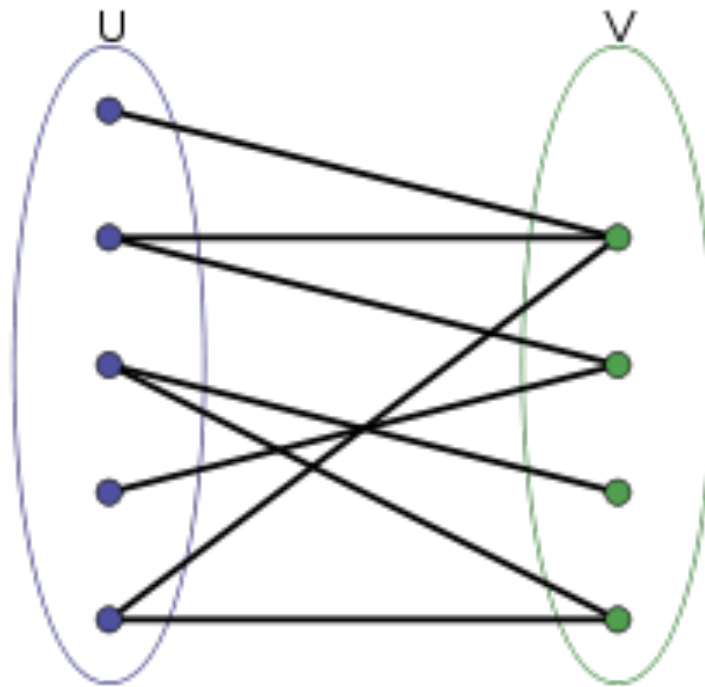
- Method:

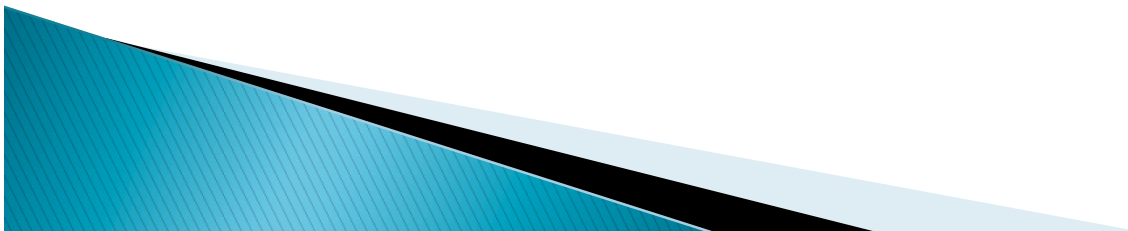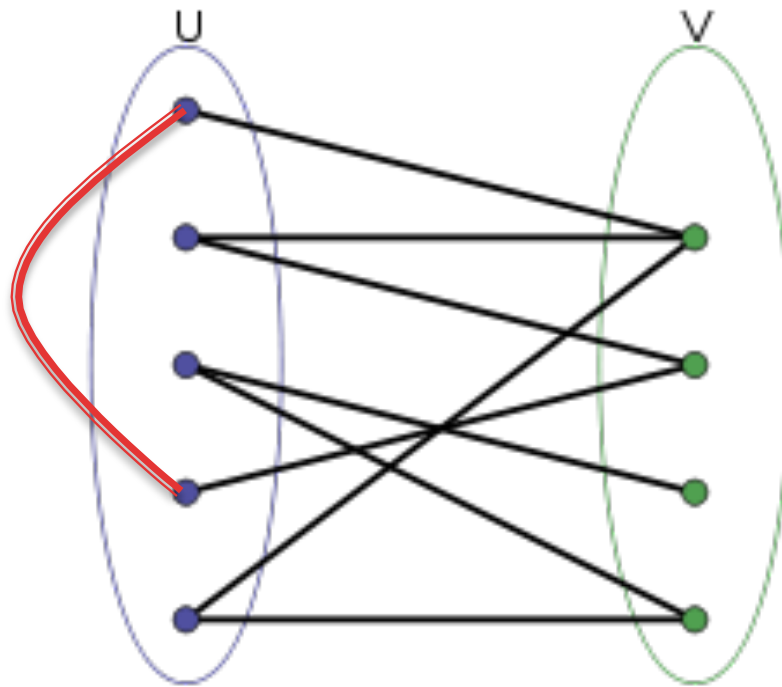Modeling a Bipartite Network: Assets-Banks
Simulation of shock scenarios

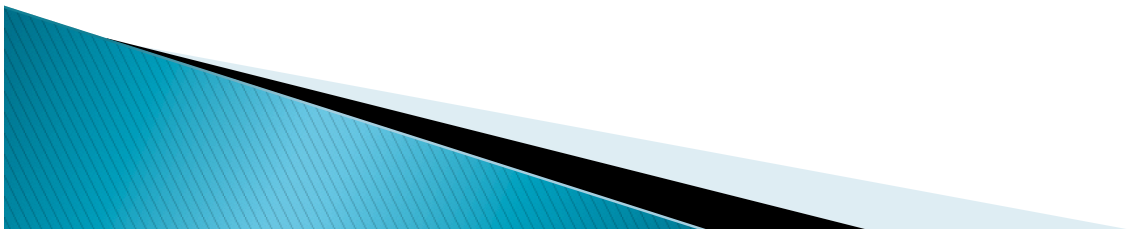# BIPARTITE NETWORKS

▸ Edges only exist across two subsets of nodes
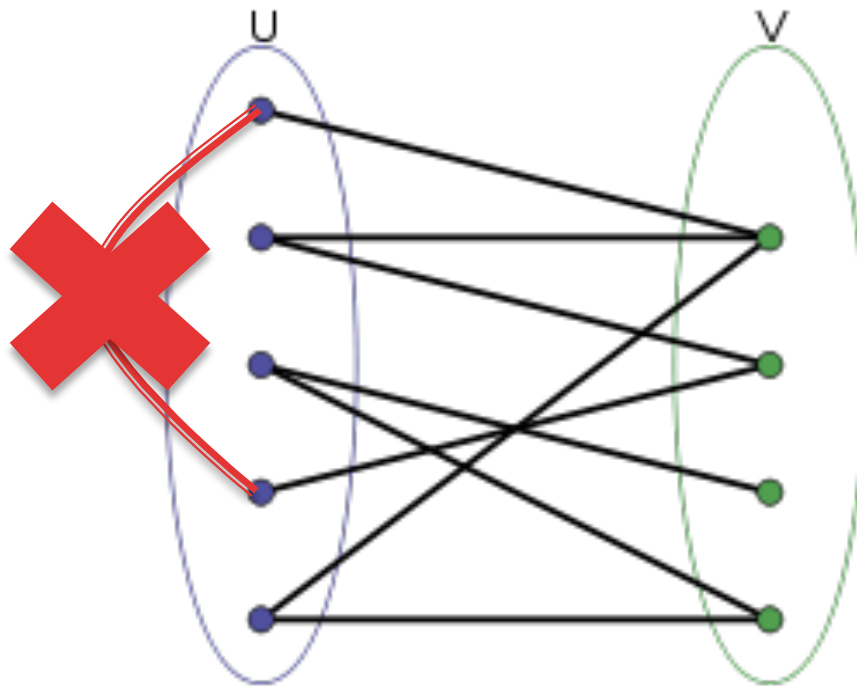
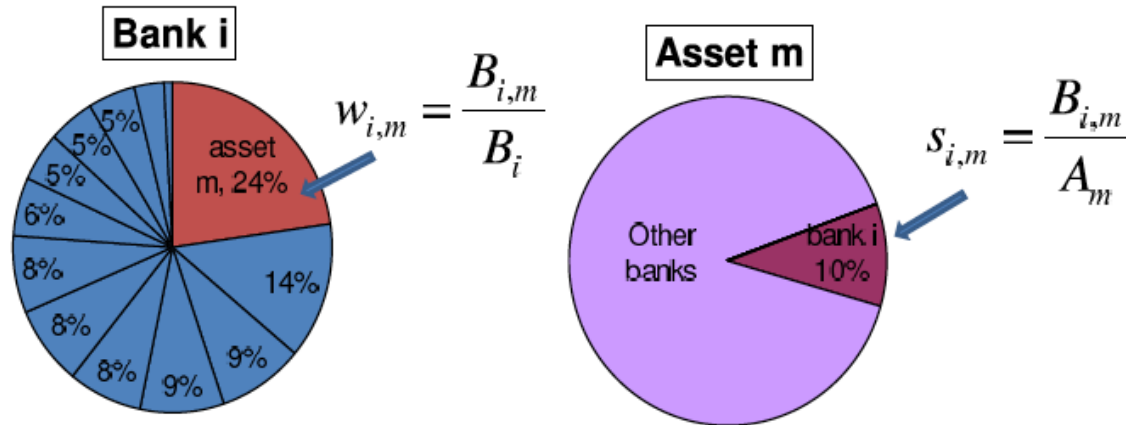# BIPARTITE NETWORKS

- Edges only exist across two subsets of nodes
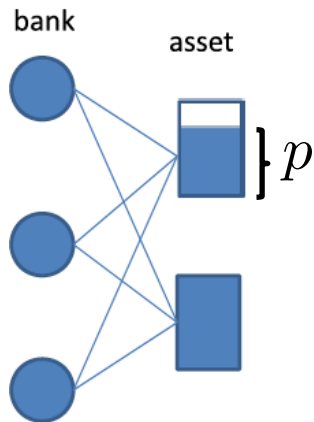
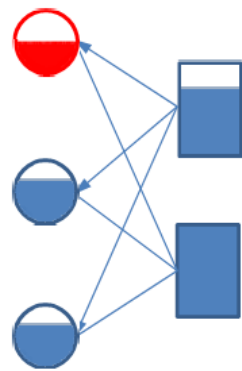▸ Edges only exist across two subsets of nodes

CASCADING FAILURE MODEL

Bank i

$$w_{i,m} = \frac{B_{i,m}}{B_i}$$

asset m, 24%

5% 5% 5% 6% 8% 8% 8% 9% 9% 14%

Asset m
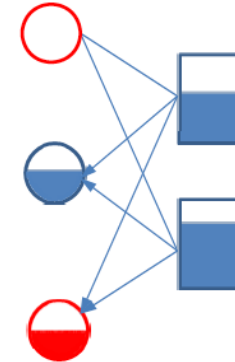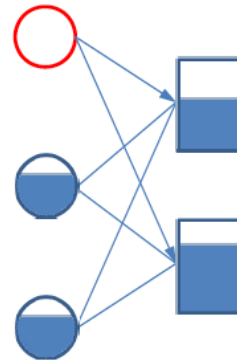
$$s_{i,m} = \frac{B_{i,m}}{A_m}$$

Other banks

bank i 10%

B_i: Total asset of bank i.
$B_{i,m}$: The amount of asset m that bank i owns.
A_m: Total market value of asset m.

bank   asset

$\}p$

fail when
asset < liability

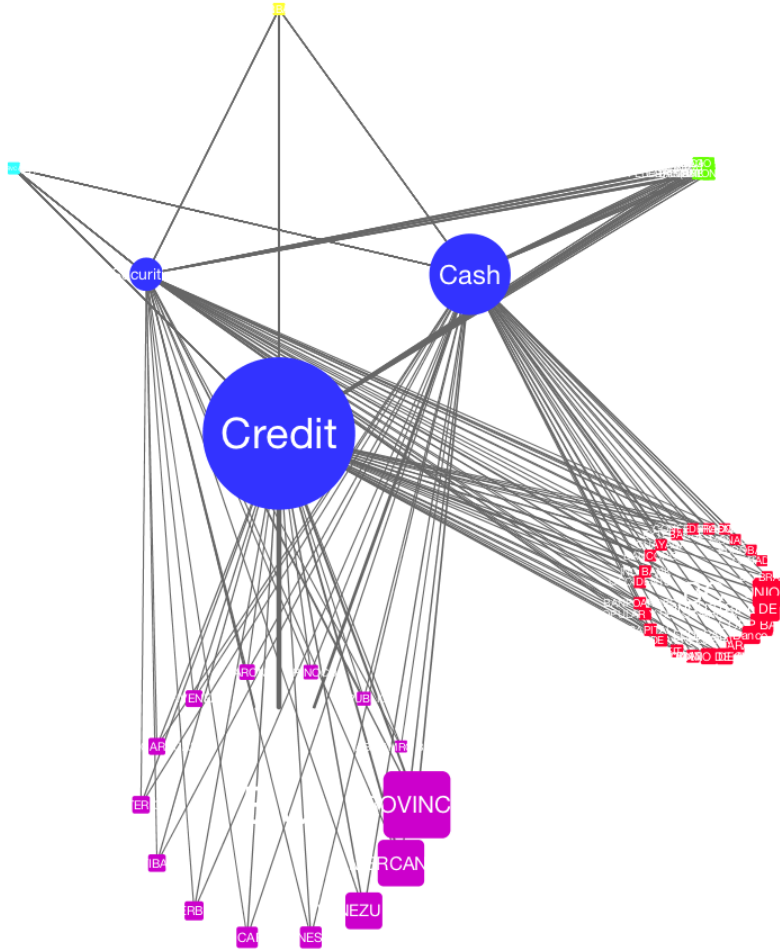assets depreciate
$\alpha B_{i,m}$

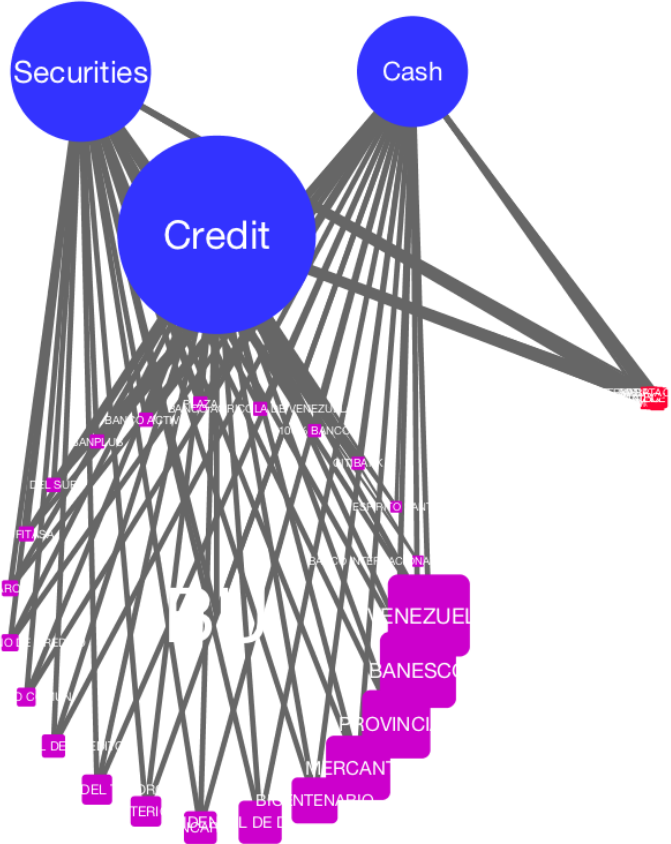Images Courtesy of
Xuqing Huang

1-p: initial shock to an asset
α : liquidity parameter
    describes market's reaction to bank failure
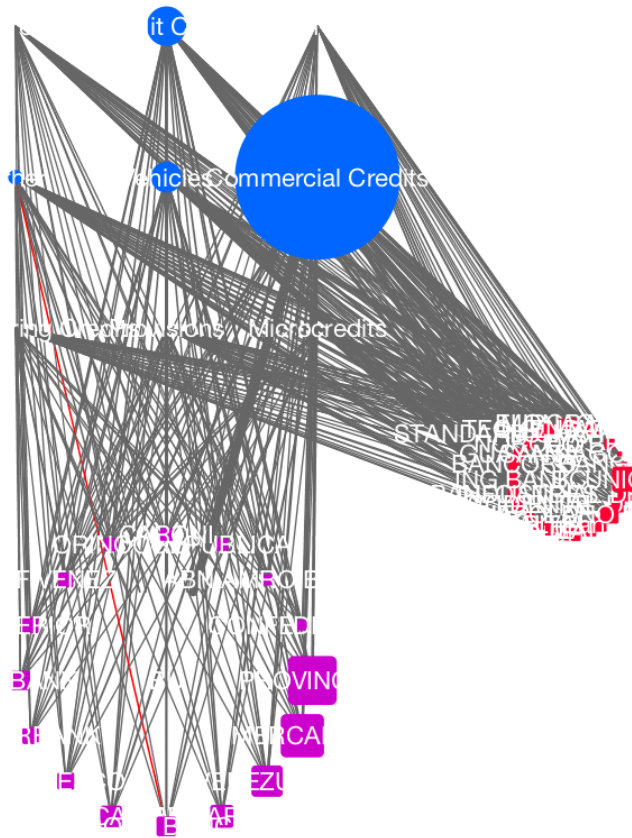
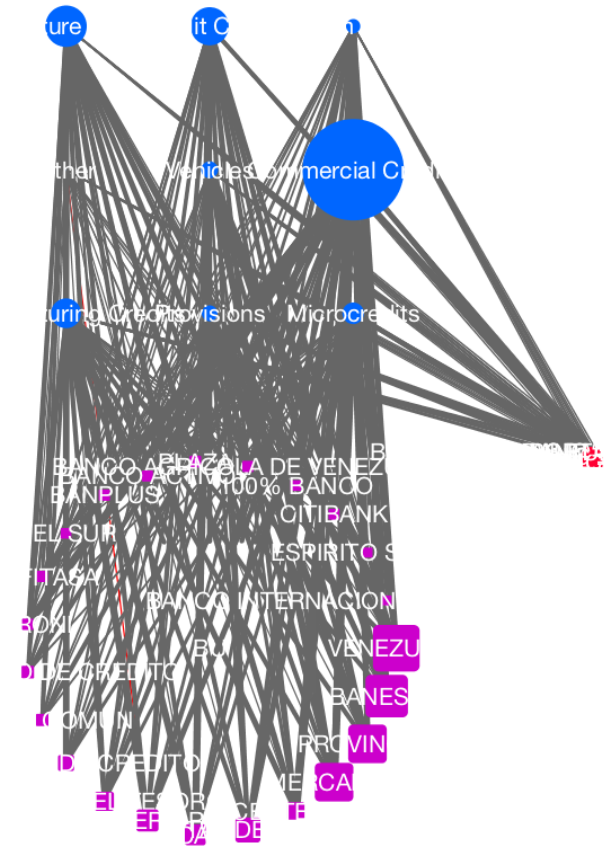# ASSET CLASS NETWORK

January 1998
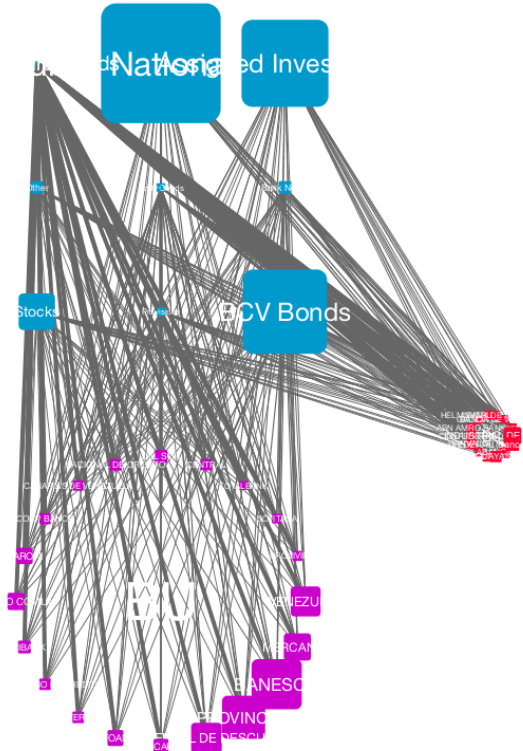
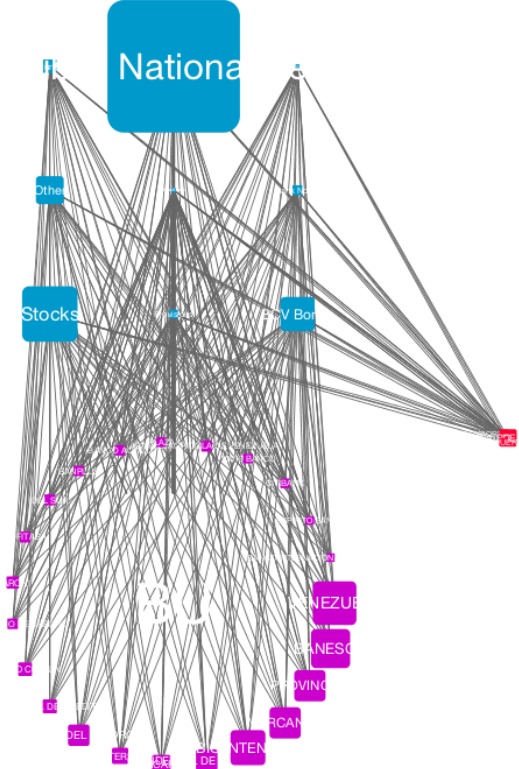December 2013

CREDIT CLASS NETWORK

January 1999

December 2013

SECURITY CLASS NETWORK

June 2005

December 2013