

Commercial Bank Charge Offs – The Need for a System View

February 8th, 2011





Key Points

- **Commercial Bank Asset Correlations Change in Time**
 - Risk Diversification Changes in Time
 - Lack of Risk Diversity Can Hurt at the Wrong Time
- **Reversion to Trend Has Long Cycles**
- **Views of Networks of Relationships are Needed**
 - Asset Correlations Changing in Time
 - Client/Customer Cash Flows Changing in Time
 - Quasi and True Experimental Designs to Understand Network Effects
 - Cause and Effect Relationships Among Agents – Predictive not just Descriptive

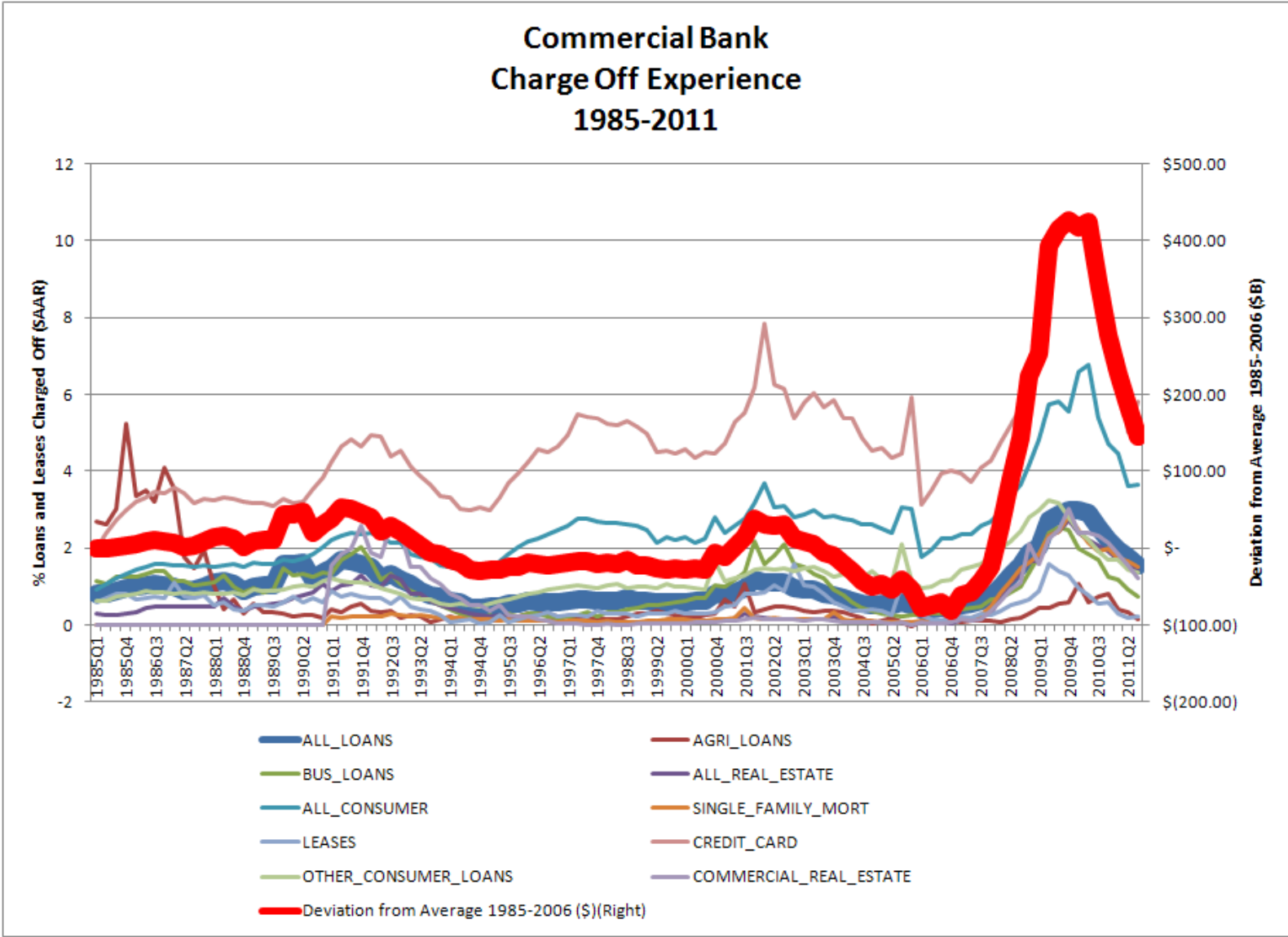


Most Importantly: A Taxonomy of Uncertainty May Be In Order

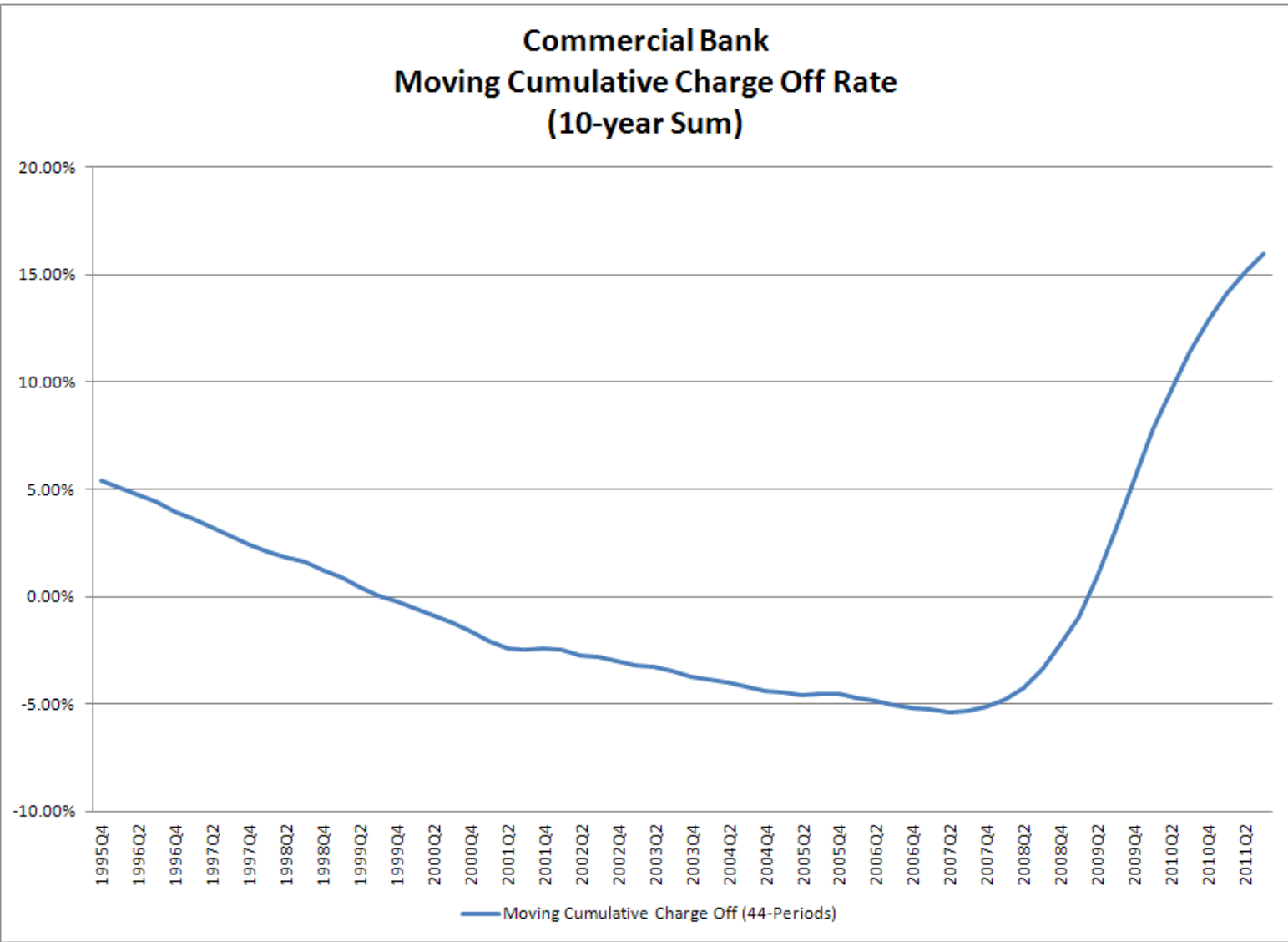
- **Level 1: Complete Certainty**
- **Level 2: Risk Without Uncertainty**
- **Level 3: Fully Reducible Uncertainty**
- **Level 4: Partially Reducible Uncertainty**
- **Level 5: Irreducible Uncertainty**

- “Physics Envy May Be Hazardous to Your Wealth!,” Andrew W. Lo and Mark T. Mueller, March, 2010.
- Video lecture available at <http://http://mitworld.mit.edu/video/794>

Commercial Bank Asset Correlations Change in Time

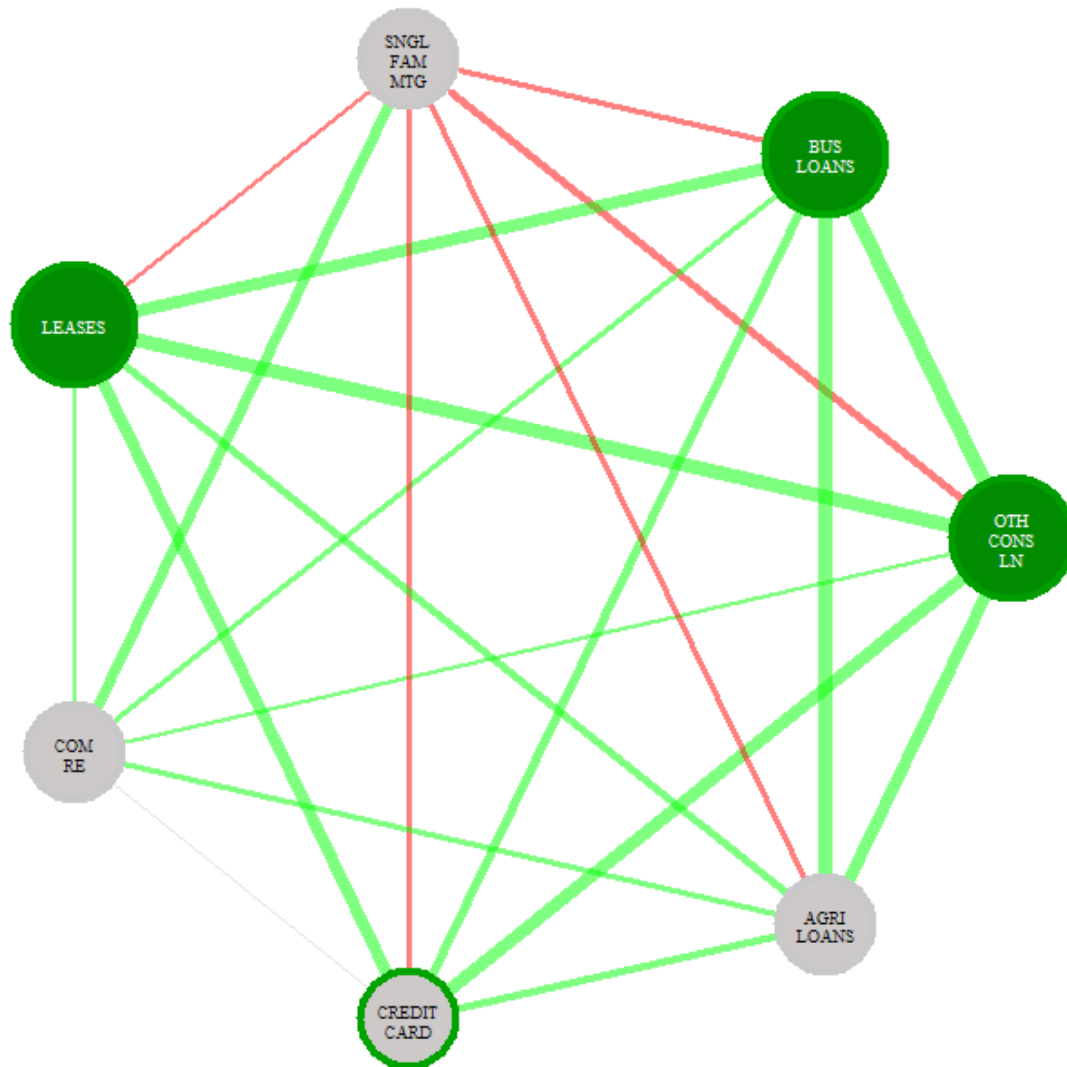


Reversion to Trend Has Long Cycles



Views of Networks of Relationships are Needed (1/11)

Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
1991Q2 -> 1993Q1



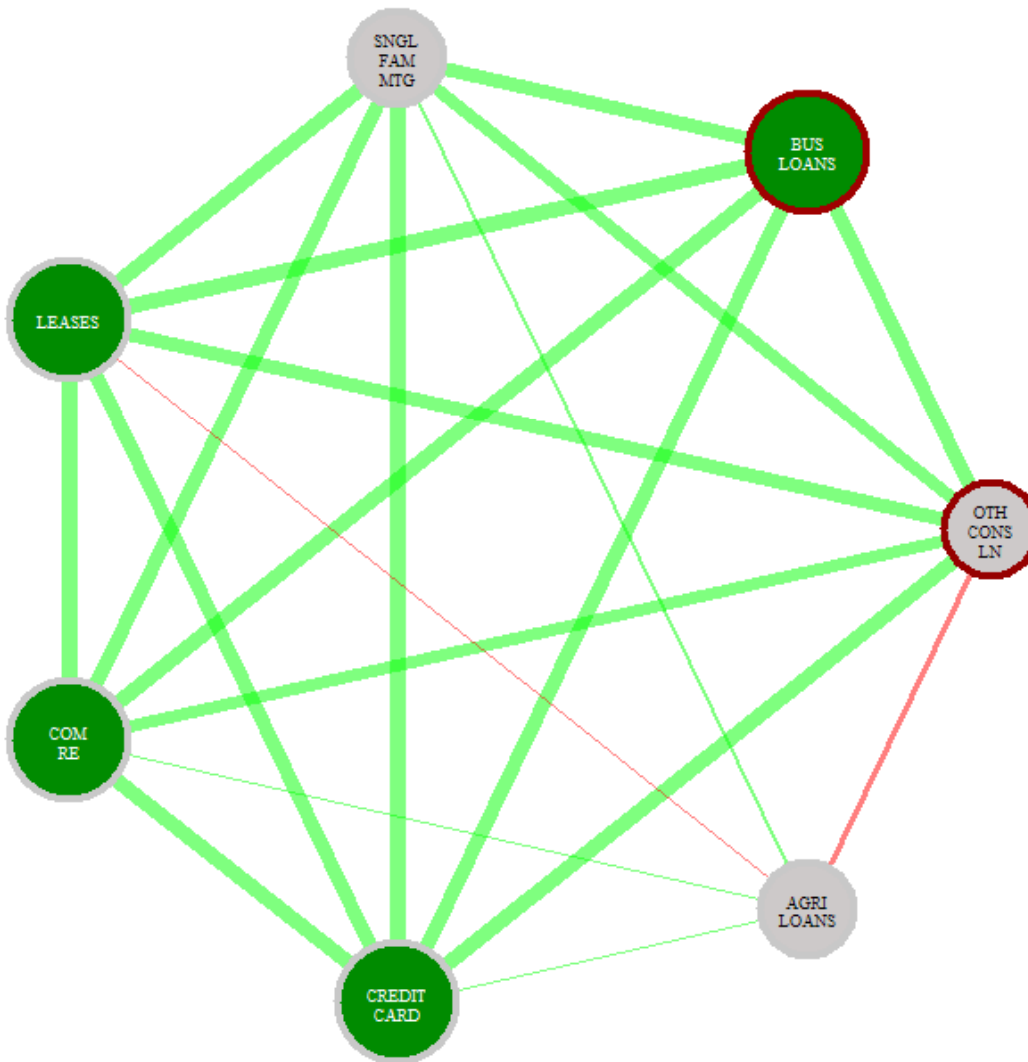
Various Asset Categories show correlations among themselves during any given period of time.

For example: Late 1991 through 1992 shows strong, positive correlations between business loans, leases and agricultural loans. The business sector shows strength in this period with respect to charge offs - lower charge-offs (green) means better creditworthiness.

Note: Correlations are tied to % of assets charged off in each asset class

Views of Networks of Relationships are Needed (2/11)

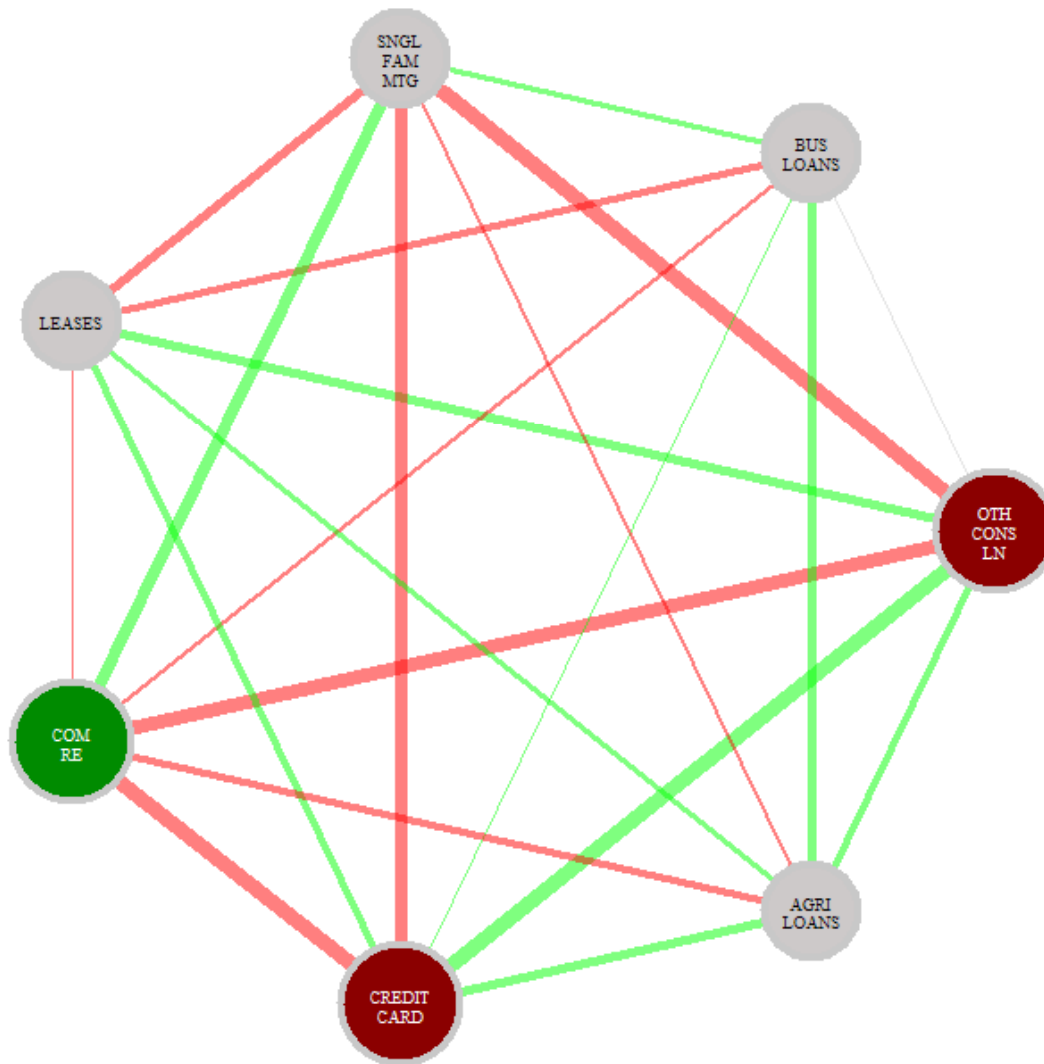
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
1993Q2 -> 1995Q1



Mid 1993 through beginning of 1995 have benign, positive correlations.

Views of Networks of Relationships are Needed (3/11)

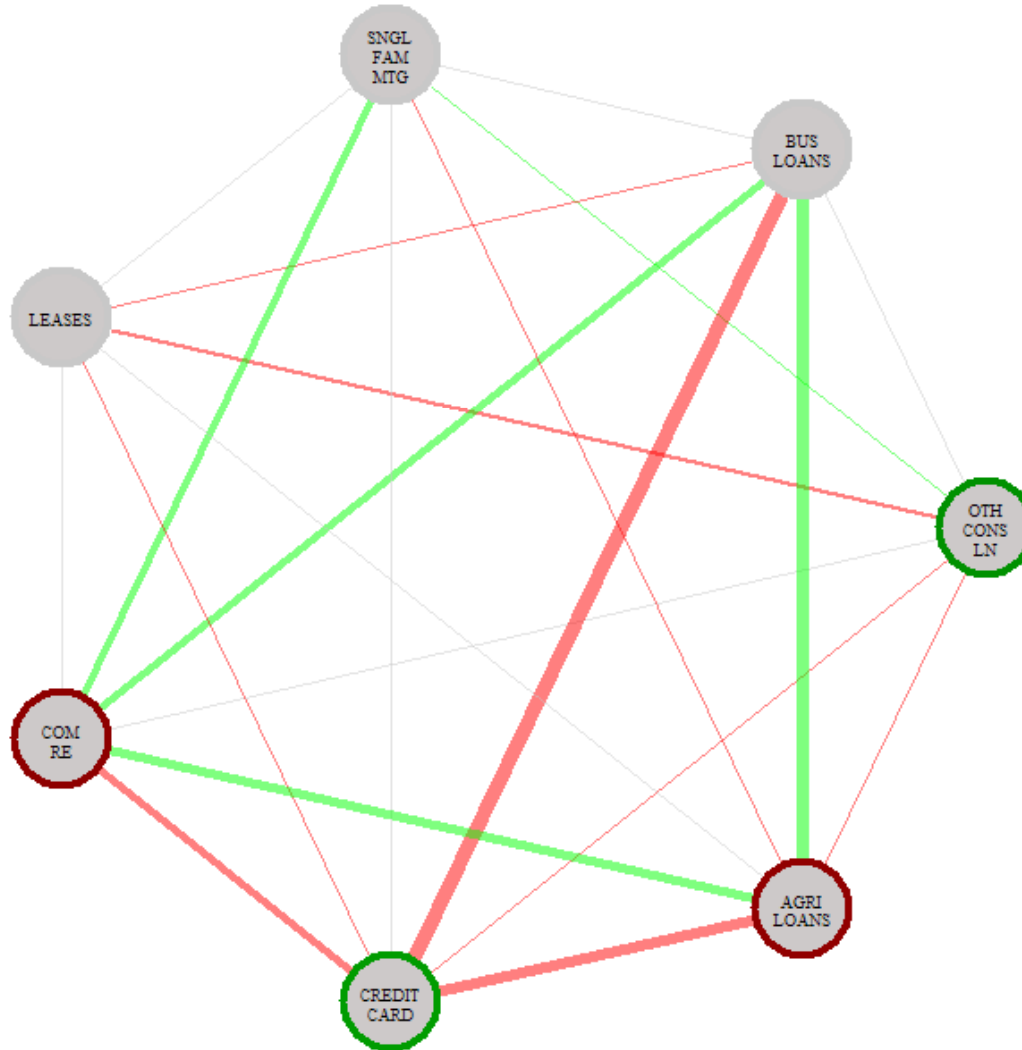
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
1995Q2 -> 1997Q1



There is a bit of credit deterioration in the mid-cycle among consumers. A diverse portfolio dampens the effect on a portfolio of bank loans and leases.

Views of Networks of Relationships are Needed (4/11)

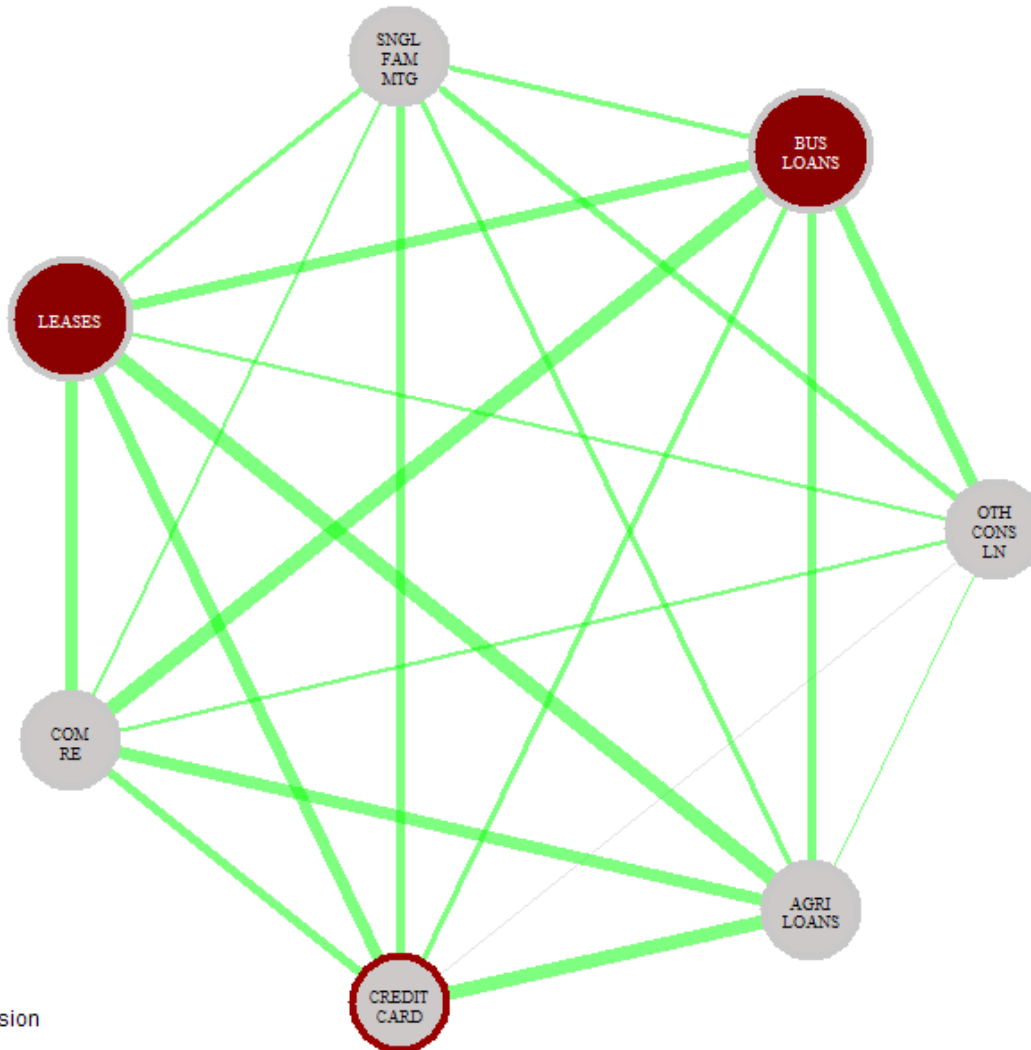
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
1997Q2 -> 1999Q1



Assets are largely unchanged from mid-1997 through the beginning of 1999. Diversification continues to help.

Views of Networks of Relationships are Needed (5/11)

Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
1999Q2 -> 2001Q1

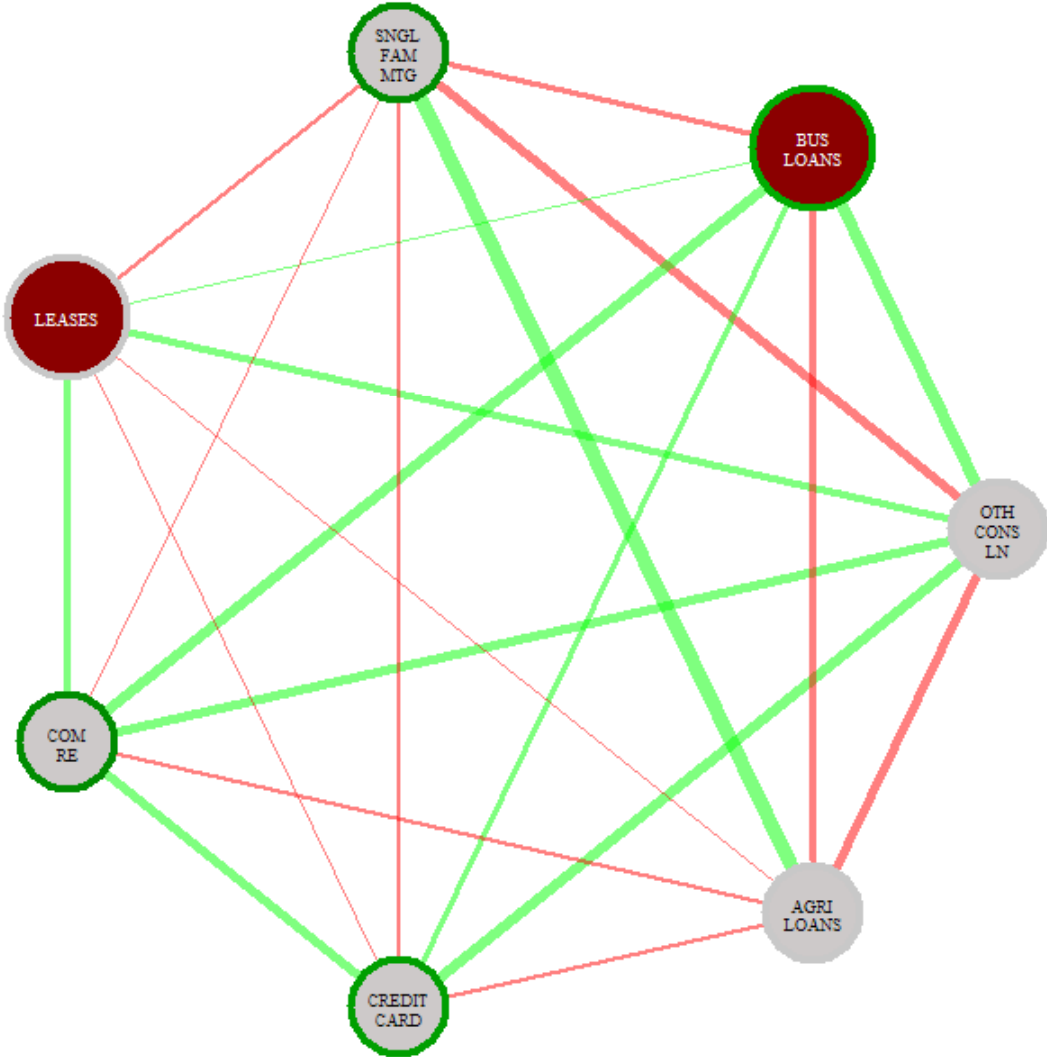


Strong positive correlations among deteriorating assets offer little diversification through the recession - both consumer and commercial loans and leases deteriorate.

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Views of Networks of Relationships are Needed (6/11)

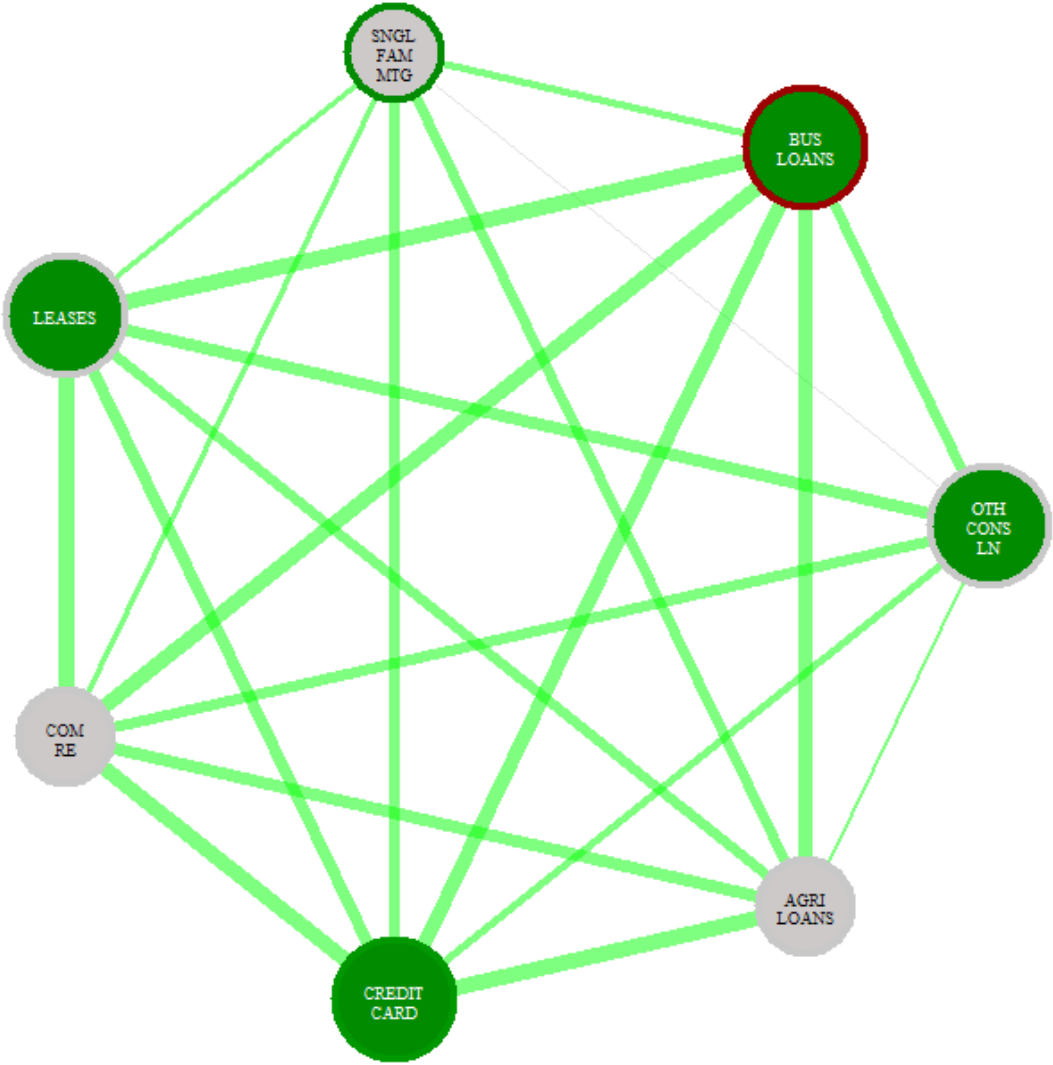
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2001Q2 -> 2003Q1



Portfolios diversify a bit...

Views of Networks of Relationships are Needed (7/11)

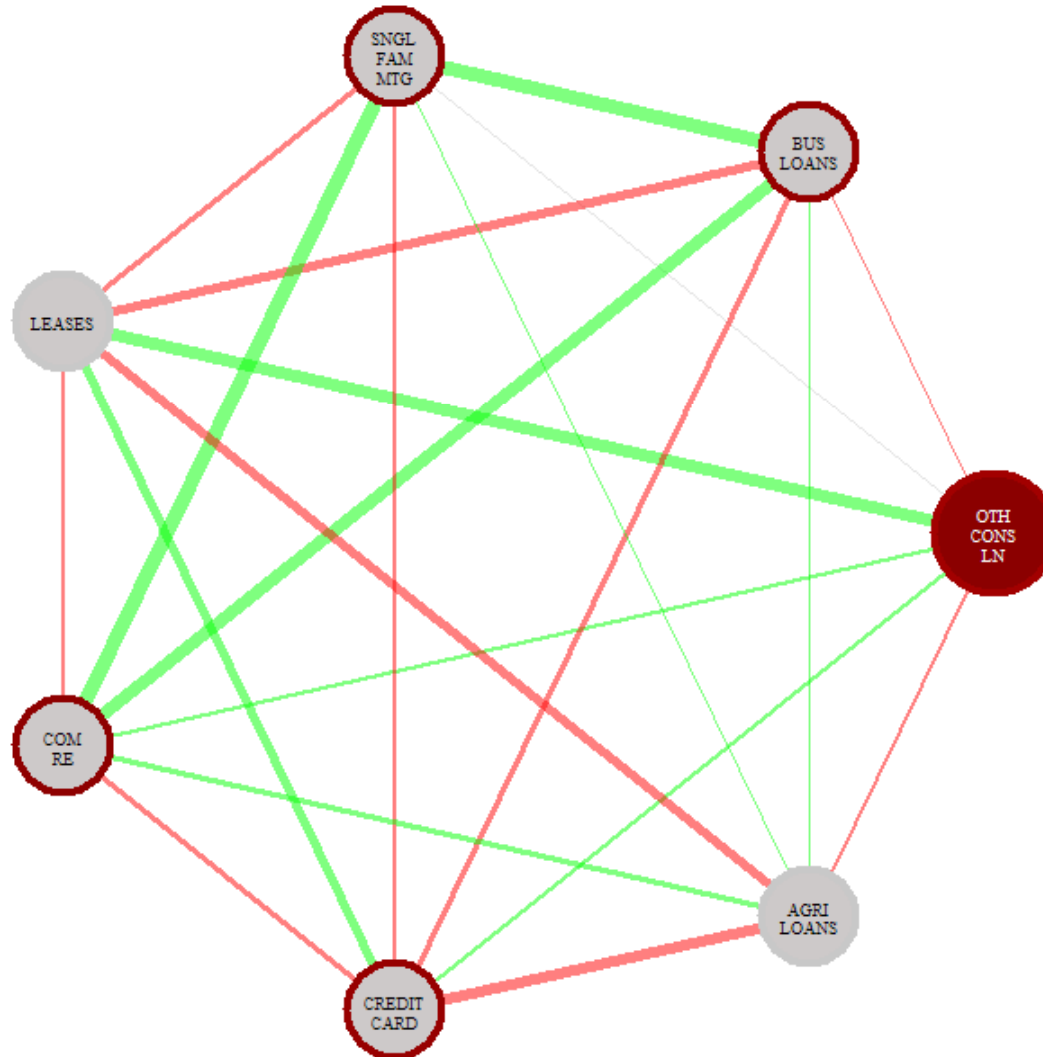
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2003Q2 -> 2005Q1



Positive benign correlations mark the mid-cycle once more...

Views of Networks of Relationships are Needed (8/11)

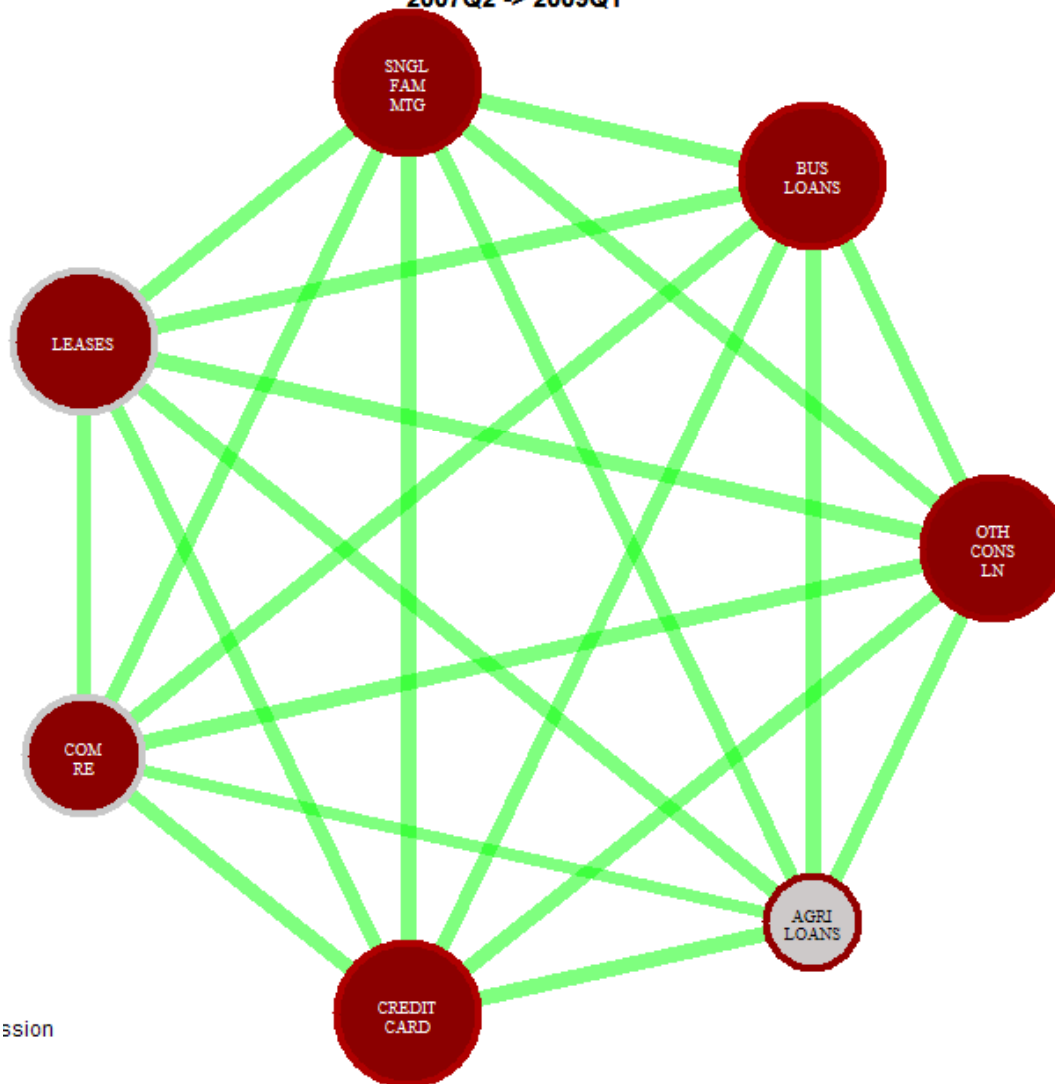
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2005Q2 -> 2007Q1



Portfolios diversify a bit, but there is a bit of deterioration in some asset classes...

Views of Networks of Relationships are Needed (9/11)

Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2007Q2 -> 2009Q1



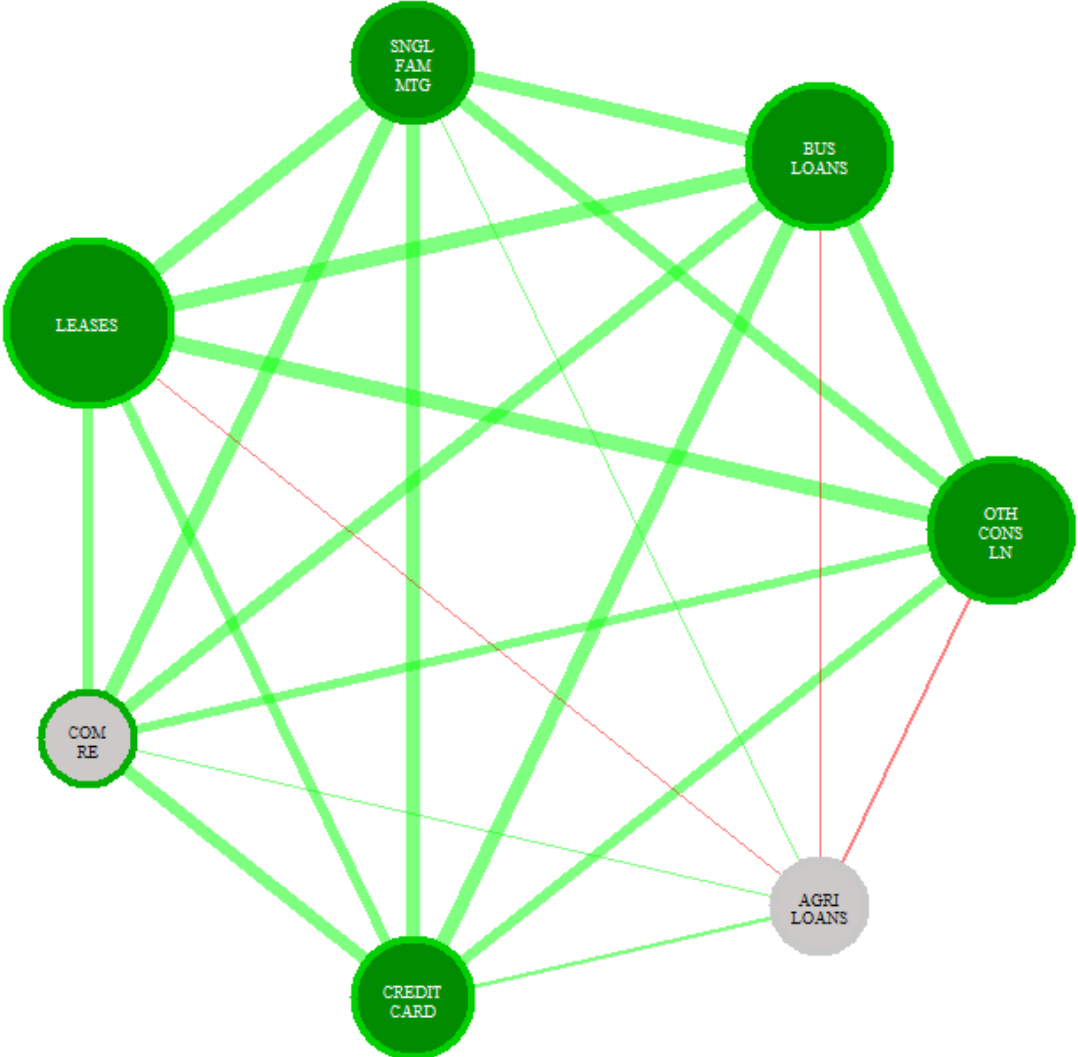
As went residential real estate, so went other assets through the credit and liquidity crisis...

Studying dynamic system relationships, especially as agents adapt with new behaviors, is a promising frontier for managing risk and optimizing risk-adjusted returns

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Views of Networks of Relationships are Needed (10/11)

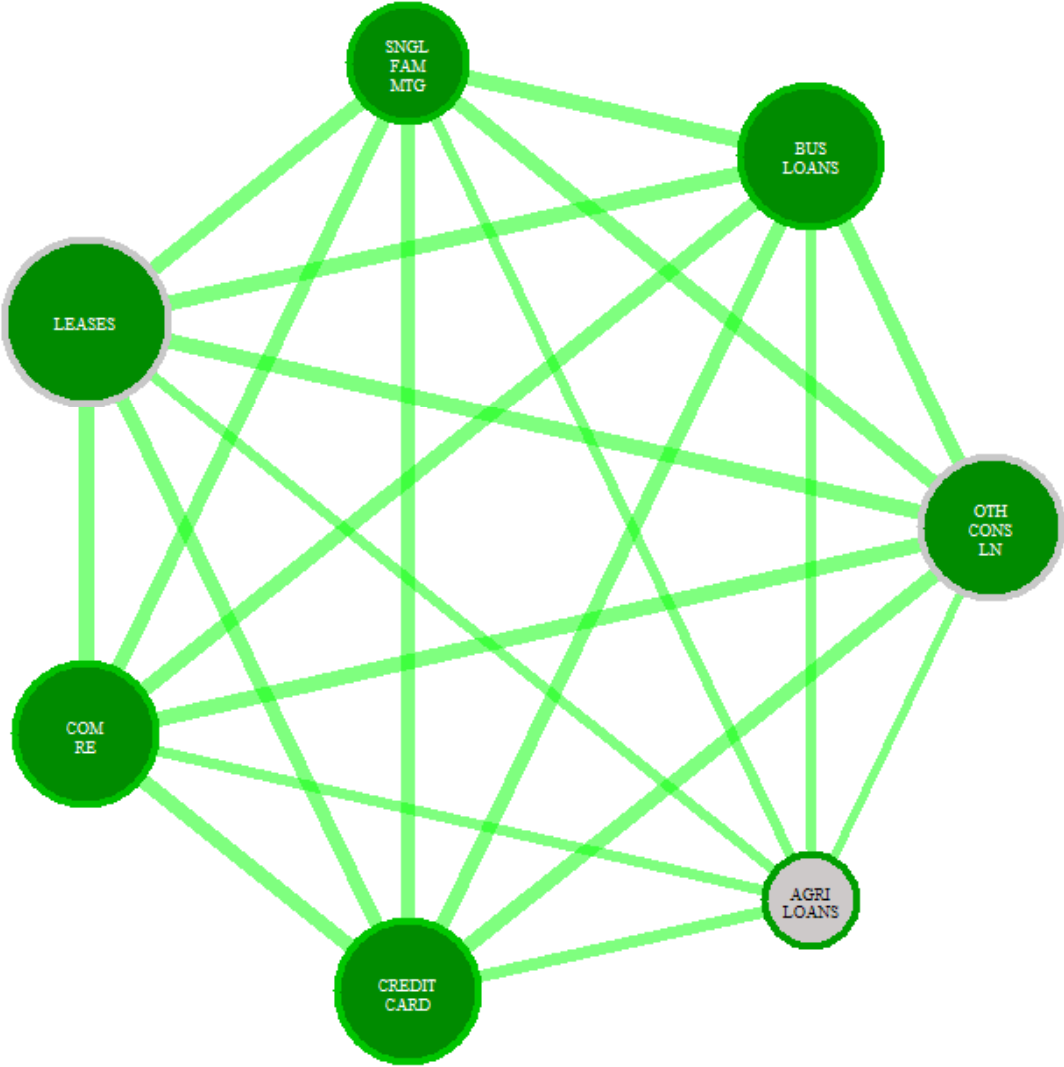
Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2009Q2 -> 2011Q1



Positive benign correlations helped the recovery of bank balance sheets...

Views of Networks of Relationships are Needed (11/11)

Correlation Matrix
Quarterly Change of Charge-off Levels Over 8 Rolling Quarters
2009Q4 -> 2011Q3



Positive benign correlations mark the mid-cycle once more...