Discussion of
"The Decline of Solvency Contagion Risk"
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Overview

The goal of the paper is to propose a model of counterparty risk exposures that can be used to analyze how a credit shock is distributed across a banking system. This work is relevant for studying contagion and for stress-testing.

The model is calibrated to the U.K. banking system over the period from 2008 to 2015 using two datasets of interbank exposures.

The authors provide conclusions showing that both the level of banks' capital and the distribution of this capital are important to understanding contagion risk in the system and its decline over the past few years.

My goal is review the model for the audience (and myself!) and hopefully ask some reasonable questions of the authors.

Model overview

The unit of analysis in the paper is a financial firm, denoted with subscript i, with a balance sheet summarized as:

$$E_i(t) = A_i(t) - L_i(t)$$

To focus on counterparty exposures via the interbank market, the model has an external sector and interbank exposures

$$E_i(t) = A_i^e(t) + \sum_j A_{ij} - L_i^e - \sum_j L_{ij}$$

Q1: The authors' first dataset "is regulatory data on large exposures that banks have to their counterparties." I am assuming that this includes derivative exposures, correct?

Q2: The authors' second dataset covers "7 banks' holdings of each other's senior unsecured and subordinated debt securities." Very different implications! Is it even useful? How large could these holdings be relative to above?

Model overview (continued)

$$E_i(t) = A_i^e(t) + \sum_j A_{ij} - L_i^e - \sum_j L_{ij}$$

"External assets follow a stochastic process…"
"…all liabilities expire at maturity T."
Q3: Why? No short-term and long-term debt management?

"…the value of external assets of bank i, which have been marked-to-market at time t."
"…external assets can be computed as the difference between total assets and interbank assets, also obtained from annual reports."
Q4: Contradiction? I am assuming that we use book value.

"For symmetry, we will also assume external liabilities are at face value, but point out that we do so without any loss of generality."
"We take interbank liabilities always at face value."
Q5: Why? This limits analysis of debit valuation adjustment (DVA), which plays a role in book-value accounting and risk management.

Calibration

$$E_i(t) = A_i^e(t) + \sum_j A_{ij} V_{ij}(\Xi(t)) - L_i^e - \sum_j L_{ij}$$

$E_i(t)$ is calibrated with "two possible interpretations…"

- From 2008 to 2015, "we have chosen to use shareholder equity, which gives us a simple and consistent measure over the period."
- "Starting from 2013, we produce an additional set of analysis based on the results of the Bank of England's stress tests…"

A_{ij} is calibrated to the two sources mentioned; L_{ij} is transpose of A_{ij}

L_i^e is the difference between published total liabilities and interbank liabilities

$A_i^e(t)$ is the difference between published total assets and interbank exposures

V_{ij} is a value function that accounts for possible counterparty default.

Calibration (continued)

$$V_{ij}\left(\Xi(t)\right) = 1_{E_j(s)>0,\forall s\in[t,T]} + \left(1 - 1_{E_j(s)>0,\forall s\in[t,T]}\right) r_j$$

$$E^Q\left[V_{ij}\left(\Xi(t)\right) \mid A^e\left(t\right)\right] = 1 - p_j^D + \rho p_j^D = 1 - p_j^D\left(1-\rho\right)$$

Q6: Why just recovery rate ρ=0 and ρ=0.6 as per senior unsecured exposures? Counterparty loss rates are much closer to zero. Why not show sensitivity of the results to the parameter?

Q7 : "We approximate the maturity of liabilities as one year." What do the datasets suggest? Is this OK for counterparty exposures? What is industry practice?

Q8 : The default probability is estimated via the Merton model using deleveraged equity volatility as an input. Maybe benchmark to industry measures, such as EDFs from Moody's Analytics, which includes private firms?

Dynamics

"…we will apply the model by carrying out simplified stress test exercises. The basic idea is to assume that an exogeneous shock hits external assets."

"…shocks in external assets will be absorbed by equity in the first instance"

$$\Delta E^{shock} = \Delta A^{e} = E^{pre-shock}(t) - E^{(0)}(t)$$

$E^{(0)}(t)$ is the new starting point for the fixed-point algorithm

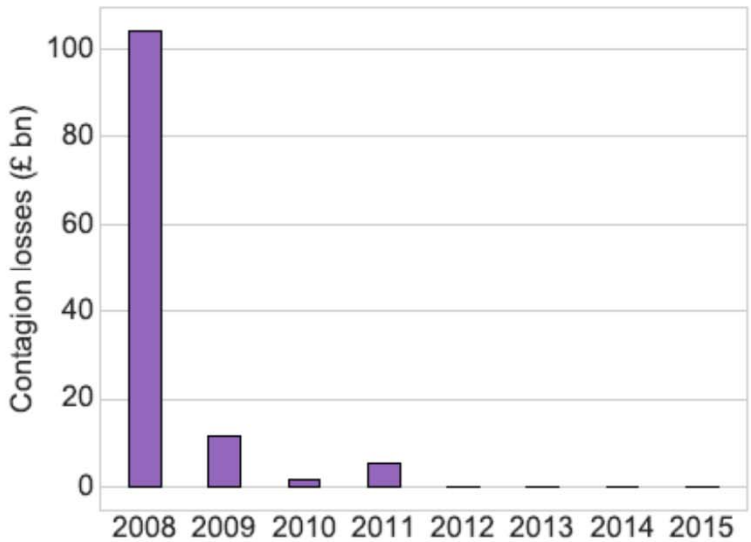
Losses due to contagion are decomposed into

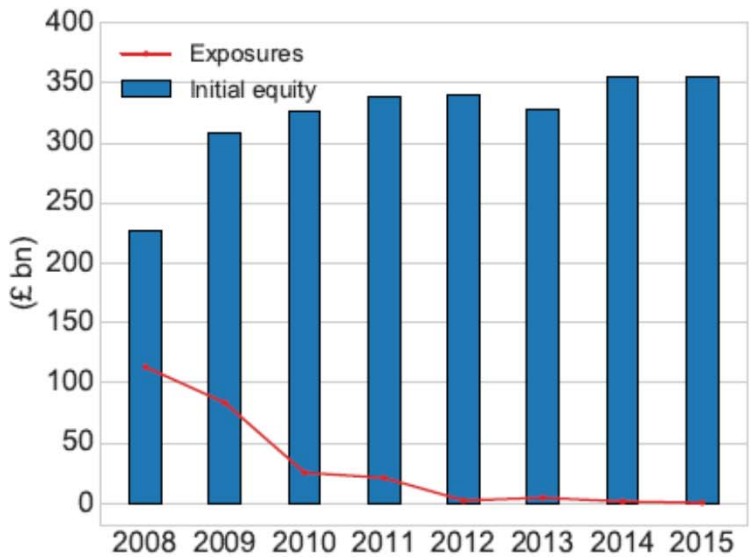
$$\Delta E^{direct} = E^{(0)}(t) - E^{(1)}(t)$$

$$\Delta E^{amp} = E^{(1)}(t) - E^{*}(t)$$

Q9: Sense of the magnitudes used in the exercise?

Current exercise





Contagion losses large in 2008 but drop sharply into 2009 and remain quite low for the rest of the sample.

Why? Increase in equity, but a huge drop in exposures.

Q10: What is context for decline in exposures? Worry at all? Need better understanding of the exposure data.

"…distribution of equity has changed…increase contagion."

Q10: Why? Need better understanding of the data.

Summary

Interesting questions,
especially about “macroprudential overlay to micro-prudential stress tests.”

Interesting solution method and approach.

Interesting first results that require more context,
especially with reference to the underlying data.