Financial Intermediation and Credit Policy in Business Cycle Analysis

Gertler and Kiyotaki
Discussion by Lawrence Christiano
Very Ambitious Paper

• Create an environment that mimics the circumstances in the recent crisis.
  – High interest rate spreads. Seem so large, they ‘ought’ to be arbitrated away.
  – Apparent fall in lending generally, and interbank loans specifically.

• Provide a framework for analyzing the various kinds of financial market interventions implemented by the Fed during the recent crisis.
  – Direct lending to private firms.
  – Lending to banks.
  – Injections of equity into banks.
Households

Firms
Bank

invest

Firms
Bank

no-invest

Firms
Bank

invest

Firms
Bank

no-invest

Firms
Bank

no-invest

Firms
Bank
Fits nicely with picture from flow of funds

<table>
<thead>
<tr>
<th>Flow of Funds Matrix, 2007, non-financial business, trillions of $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use of Funds</strong></td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Gross saving (i.e., undistributed profits)</td>
</tr>
<tr>
<td>Capital expenditures</td>
</tr>
<tr>
<td>Sales of financial assets</td>
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<tr>
<td>Purchases of financial assets</td>
</tr>
</tbody>
</table>
• Understanding G-K framework and tinkering with it will be on the agenda for years.

• Virtue of the model is that, like the real world, it has lots of moving parts.
  – Many periods
  – Some firms constrained, some not.

• A first approach to understanding the paper may be to break the parts into little pieces.
Two-period Version of GK Model

• Many identical households, each with a unit measure of members:
  – Some members are ‘bankers’
  – Some members are ‘workers’
  – Perfect insurance inside households...workers and bankers consume same amount!

• Period 0
  – Workers endowed with \( y \) goods, household makes deposits in a bank
  – Bankers endowed with \( N \) goods, take deposits and purchase securities from a firm.
  – Firm issues securities to finance capital used in production in period 1.

• Period 1
  – Household consumes earnings from deposits plus profits from banker.
  – Goods consumed are produced by the firm.
### Problem of the Household

<table>
<thead>
<tr>
<th>period 0</th>
<th>period 1</th>
</tr>
</thead>
</table>

| budget constraint | $c + d \leq y$ | $C \leq R^d d + \pi$ |

| problem | $\max_{d,c^h,c^H}[u(c) + \beta u(C)]$ |

### Solution to Household Problem

\[
\frac{u'(c)}{\beta u'(C)} = R^d \quad c + \frac{C}{R^d} \leq y + \frac{\pi}{R^d}
\]

\[
u(c) = \frac{c^{1-\gamma}}{1-\gamma} \quad c = \frac{y + \frac{\pi}{R^d}}{1 + \frac{\beta R^d}{R^d}^{\frac{1}{\gamma}}}
\]
## Efficient Benchmark

### Problem of the Bank

<table>
<thead>
<tr>
<th>Period</th>
<th>Action</th>
<th>Period</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>take deposits, $d$</td>
<td>1</td>
<td>pay $dR^d$ to households</td>
</tr>
<tr>
<td></td>
<td>buy securities, $s = N + d$</td>
<td></td>
<td>receive $sR^k$ from firms</td>
</tr>
</tbody>
</table>

**Problem:** $\max_d [sR^k - R^d d]$
Properties of Efficient Benchmark

Equilibrium: $R^d, c, C, d, \pi$

(i) household problem solved
(ii) bank problem solved
(iii) market clearing

• Properties:
  – Household faces true social rate of return on saving:
    \[
    R^k = R^d
    \]
  – Equilibrium is ‘first best’, i.e., solves
    \[
    \max_{c,C,k} u(c) + \beta u(C) \\
    c + k \leq y + N, \ C \leq kR^k
    \]
Friction

• bank combines deposits, $d$, with net worth, $N$, to purchase $N+d$ securities from firms.

• bank has two options:
  
  – (‘no-default’) wait until next period when $(N + d)R^k$ arrives and pay off depositors, $R^d d$, for profit:

  $$(N + d)R^k - R^d d$$

  – (‘default’) take $\theta(N + d)$ securities, leave banking forever, refuse to pay depositors and wait until next period when securities pay off:

  $$\theta(N + d)R^k$$
Incentive Constraint

- Bank will choose ‘no default’ iff
  \[
  (N + d)R^k - R^d / \sum_{j=0}^{\infty} \lambda_{t,j}[(N_{t+j} + d_{t+j})R_{t+j}^k - R_{t+j}^d d_{t+j}] \geq \theta(N_t + d_t)R^k
  \]

- With time, condition is:
  \[
  \sum_{j=0}^{\infty} \lambda_{t,j}[(N_{t+j} + d_{t+j})R_{t+j}^k - R_{t+j}^d d_{t+j}] \geq \theta(N_t + d_t)R^k
  \]

- Bank will never contemplate a \( d \) that violates incentive constraint because it understands households would make zero deposits.

- For some parameters, banks constrained, others not.
  - When constrained, there is premium, \( R^k > R^d \), that market will not arbitrage away.
Properties of Equilibrium with Financial Friction

• Equilibrium deposits, $d$, higher with $N$.
  
  – Low net worth of bankers reduces intermediation below first-best.
  
  – Redistribution from workers to bankers increases welfare.

• Can study:
  
  – direct govt lending financed by taxes
  – govt taking equity stake in banks.
  – lending to banks.
Questions

• How to interpret the financial friction?
  – Literal? Can people really just not pay liabilities?
  – Is it a metaphor for something?

• One might be tempted to think of it as a stand-in for a model with hidden information, but,
  – there is no hidden information in the model.
  – there are alternative models with hidden information (Holmstrom-Tirole)
Other Comments

• How important is the pecuniary externality channel in the analysis?

• Direct Fed lending creates a pecuniary externality:
  – Fed is like a rich person who comes to town, raises the price of real estate by buying (or, helping others buy), and improves everyone’s balance sheets.
  – How important is this channel in the model? But, is this the best way to get price of capital up?
  – What about investment tax credit or some alternative?

• What about the shock that created the crisis?
  – Hard to interpret the one used in the model.
  – Isn’t a spontaneous Kiyotaki-Moore/Moore crisis possible in this model? Wouldn’t that be the perfect shock?
Conclusion

• My comments are in the nature of my suggestions for ‘tinkering’ with the framework.
  – The two period model may be useful for thinking about aspects of the model in isolation.

• This paper sets an important agenda for research on interface between central banking and the economy.