Money Creation and Liquid Funding Needs

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The views expressed are those of the authors and do not necessarily represent those of the IMF or the OeNB.
Motivation: Three views

- Financial intermediation view: neither individual banks nor banking system creates money when granting loans. Pure intermediation.
- Fractional reserve view: individual banks do not create money when granting loans, but the banking system does.
- Money creation view: individual banks and hence the banking system create money when granting loans.
|-----------------------------|--------------------------------------------------------------------------------------------------|
Money creation view + Chicago plan

• Before/after Great Depression 1929: money/credit creation view entirely mainstream and fully understood

• Chicago plan: consequent idea after Depression in 1930s to deprive banks of private money creation ability; assign this role to GOV’s; never implemented

• Gurley & Shaw (1955) supposedly one of major reasons for change in direction toward misleading, false intermediation view

• Intermediation view more than half a century reflected in mainstream economic (DS)GE models, equating banks with non-bank fin. institutions: underestimating banks’ role in creating system leverage, thus understandable that banks/credit got dropped from mainstream DSGEs for long

• Money creation view back in focus after 2008 crisis, ‘empirical’ confirmation by Werner (2014)

• And: central bankers tend to understand the money creation aspect (see next slide)
Bernard Coardé (ECB Executive Board), saying:

“...about 90% of the money created in the system is created by banks...”
What we do + Our message

1. Literature review (1920-2019), two observations:
   - Understanding of money creation “cyclical”, resurfacing after “heavy recessions”, as after 1930s and 2007-09
   - Missing understanding that money creation and liquid funding needs compatible (but loanable funds theory as such misleading and wrong nonetheless)

2. Simple ABM, to highlight:
   - Money creation and liquid funding needs compatible: liquid funds, incl. outside CB reserves, required to accomplish transfers of deposits (created through loans) in multi-bank system
   - Reducing system down to one commercial bank (and assuming no cash): liquid funding needs would vanish → no role for central bank (no handle on economic dynamics)

3. Develop generic definition of shadow banking
A simple multi agent-based model

Initialize bank and private sector balance sheets at T0
- Money stocks drawn from uniform distribution
- N private sector agents assigned to B “house banks”
- Money holdings are bank deposits, no loans yet

Draw spending pattern
- Private agents receive spending signal if draw from uniform distribution > spending propensity parameter
- The spending agents find a random partner for spending the money with (excl. themselves)
- Spending private agents inform house bank about how much they transfer to whom

Cross-bank transfers
- Banks compute net transfer needs across banks, can be positive or negative. Sums to zero system-wide.
- If a bank's liquid funds fall short of positive liquid funding transfer need, pull shortfall from CB agent
- Banks with outstanding CB debt pay policy rate

Loan creation and repayment process
- Banks get random signal to grant one-period loans to their yet-non-loan holding depositors
- Interest rate is set s.t. bank profits are zero
- Loan holding private agents pay principal and interest

No credit risk: agents that cannot repay have a “spending block” until their loan is repaid
Simulated paths (selected model variables)

**Note:** This is one exemplary simulation set from the ABM. Numbers do not need to be interpreted due to the very stylized nature of the model.
Gradually compressing banking system down to “singular” system...

... reduces liquid funding needs while spending activity and loan stocks/flow dynamics remain unchanged.

**Note 1:** Central bank funding needs and interest rates approach zero already when reaching about 20 banks. This is because the balance sheets of all agents are initialized in a way that outside “off-the-leash” money (not created by commercial banks through loans nor central bank funds) is available in the system to back intra-bank transfers. If the amount of this “off-the-leash” money would be reduced, then the number of banks at which the “singular banking system” would be reached would come closer to one bank.

**Note 2:** Blue lines depict the median, grey lines the 25th/75th percentiles from 500 simulation rounds of the model, each for 300 periods forward in time.
Scope of the model

Real-world interest rate components

<table>
<thead>
<tr>
<th>Included in the model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refinancing cost</td>
</tr>
<tr>
<td>+ Administrative cost</td>
</tr>
<tr>
<td>+ Cost of risk</td>
</tr>
<tr>
<td>+ Cost of Equity / Profit margin</td>
</tr>
</tbody>
</table>

= Loan interest rate

- Lack of profit margin → no monopoly/oligopoly rents, even in small systems
- The model is mechanistic, largely without behavioral elements
- But that’s on purpose to make a simple point:

1) Money creation view entirely consistent with liquid funding needs *in multi-bank system*
2) Liquid funding needs cease to be relevant (*) in singular banking system, where singular bank still creates money but no cross-bank transfers required

* Assuming that physical cash is absent
Our proposed definition of bank and shadow bank lending

- **Inside money** is money created through bank loans
- **Outside money** is the stock of money left in the system if all credit was repaid (initial endowment)
- **Total money** = inside + outside money

**BANK LENDING:** Bank lending creates and destroys (the latter through repayment) inside money and hence total money stocks.

**SHADOW BANK LENDING:** Shadow bank lending does not create nor destroy inside money and hence total money stocks.

- Difference to FSB definition: focus on money creation, not whether banks are regulated
- Both forms of lending create leverage for the borrower, but only bank lending expands total money stocks
- Shadow banks are pure financial intermediaries
- **Banks** do also perform shadow bank lending activities, e.g. wealth management and proprietary trading (when investing in debt securities), but their main business is loan granting and that’s money creation
Conclusions

• Money creation not a theory but an accounting reality

• Messages we convey:
  1. Difference between “singular” and “non-singular” banking systems: liquidity risk absent in system consisting of only one bank (and no physical cash); “mini-ABM” shows this is true even for sufficiently small multi-bank systems
  2. “Money creation” and “funding needs” compatible in multi-bank system: deposit/money created through loans expected to be transferred, hence need for liquid funds; can be pulled from within system or if insufficient from CB; ex post funding need not negating fact that money is created ex ante
  3. Very hypothetical yet insightful thought in our view: Central bank would lose handle on economic dynamics if banking system was reduced to singular bank (assuming no cash)

• Banking/Shadow-banking definitions based on money creation implications.

• Shadow banking examples:
  o Primary bond markets
  o Peer-to-peer lending
  o Lending by other non-bank financial institutions (investment funds, pension funds, insurance companies,...)
Money creation example in a Python-based double-entry bookkeeping system

""" Initialize balance sheets (outside money endowments)--------------------------"""
debtor.book(debit=[('money holdings',100)],credit=[('equity',100)],text='Initial endowment')
bank.book(debit=[('reserves',100)],credit=[('deposits',100)],text='Initial endowment')

""" Granting of a loan ---------------------------------------------"""
bank.book(debit=[('loans',100)],credit=[('deposits',100)],text='Loan granting')
debtor.book(debit=[('money holdings',100)],credit=[('loan liabilities',100)],text='Take out loan')

""" Interest payment ---------------------------------------------"""
bank.book(debit=[('deposits',5)],credit=[('income',5)],text='Interest payment')
debtor.book(debit=[('expenses',5)],credit=[('money holdings',5)],text='Interest payment')

""" Dividend payment ---------------------------------------------"""
bank.book(debit=[('equity',5)],credit=[('deposits',5)],text='Dividend payout')
bank_owner.book(debit=[('money holdings',5)],credit=[('income',5)],text='Dividend income')

Initial Balance Sheets

<table>
<thead>
<tr>
<th>Debtor</th>
<th>Bank owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset accounts:</td>
<td>Equity: 0</td>
</tr>
<tr>
<td>money holdings: 100</td>
<td>Total Assets: 0</td>
</tr>
<tr>
<td>Equity: 100</td>
<td></td>
</tr>
<tr>
<td>Total Assets: 100</td>
<td></td>
</tr>
</tbody>
</table>

Final Balance Sheets

<table>
<thead>
<tr>
<th>Debtor</th>
<th>Bank owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset accounts:</td>
<td>Asset accounts:</td>
</tr>
<tr>
<td>money holdings: 195</td>
<td>money holdings: 5</td>
</tr>
<tr>
<td>Liability accounts:</td>
<td>Equity: 5</td>
</tr>
<tr>
<td>loan liabilities: 100</td>
<td>Total Assets: 5</td>
</tr>
<tr>
<td>Equity: 95</td>
<td></td>
</tr>
<tr>
<td>Total Assets: 195</td>
<td></td>
</tr>
</tbody>
</table>

https://github.com/AB-CE/abcFinance
Background slides
Simulated paths

- Total spending flows
- Percentage of agents spending
- Loan interest payment flows
- Percentage of loan receiving agents
- Central bank interest payment flows
- Policy rate
**Sensitivities**

SP: Spending propensity.

SF: Spending fraction (of income).

LP: Loan granting propensity.

#B: Number of banks.

<table>
<thead>
<tr>
<th>Sensitivities</th>
<th>SP</th>
<th>SF</th>
<th>LP</th>
<th>#B</th>
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</thead>
<tbody>
<tr>
<td><strong>Banks</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Reserve stock [R]</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>Deposit stock [D]</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>Central bank funding stock [F]</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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<tr>
<td>R/(L+R)</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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<tr>
<td>L/D</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
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<tr>
<td>E/(L+R)</td>
<td>![Up]</td>
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<tr>
<td>F/E</td>
<td>![Up]</td>
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<tr>
<td>F/(L+R)</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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<tr>
<td>% of banks pulling F</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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<tr>
<td><strong>Private agents</strong></td>
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<tr>
<td>(M-L)/M</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>spending flows</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>% of agents spending</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>% of agents with spending block</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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<tr>
<td><strong>Focus: Loan business</strong></td>
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<tr>
<td>Loan interest rates</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>% of agents receiving new loans</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>New loan flows</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>Principal repayment flows</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
</tr>
<tr>
<td>Interest payment flows</td>
<td>![Up]</td>
<td>![Up]</td>
<td>![Down]</td>
<td>![Up]</td>
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</tbody>
</table>
Selected literature

Fisher 1936. Money creation view. Proponent of 100% reserve system (Chicago plan) to remove cause of boom-bust cycles + better control via policy. Root of debt paradox: too much short term debt and too great a contraction of circulating medium later.

Simons 1936. Money creation view. Money creation to be left to government, distribution to commercial banks. Private sector short-term borrowing to be discouraged to maximum extent.

Wicksell 1936. Money creation. Need for reserves to fall the less people use physical money.

Friedman 1948. Focus on long-run objective of policy. Assume cycles have no impact on long-run growth. Government to provide monetary framework, under “rule of law”. Hence eliminate private bank credit/money creation, in line with Simons and others.
Selected literature


Tobin 1963. “Fountain pen money” metaphor for credit/money-creating banks entirely “traditional” in his generation. Fin. institutions other than banks do not create money; their lending (passing-on) limited by liabilities. Difference between money and non-money continuous, not binary.


Lindner 2012. ‘Saving finances investment’ notion plain wrong. Stock-flow consistent accounting perspective useful to get economic phenomena right.
Werner 2014/16. Literature review w.r.t. financial intermediation/fractional reserve view/ money creation. “Empirical” test with a German bank (sit next to loan officers and IT staff, with BBC etc. present). Proof that no funds have to be available first. Reference to Bank Charter Act 1844 in England and NY Free Banking Act 1838 in US: basis for demand deposit system with passive note issuance by CBs.

Jakab & Kumhof 2015. Re-design DSGE model to correctly reflect money creation view. Model implies: 1) when shocking debtors’ creditworthiness, bank BS reaction much more pronounced under credit creation than under intermediation model; 2) adjustment process depends much less on prices (lending spreads); 3) pro-cyclical rather than counter-cyclical bank leverage and significant role for quantity rationing rather than price rationing during downturns.
Agents in the Eurace 2.0 model (Gross, Hilberg, Kohlweyer, van der Hoog 2019, forthcoming)

In more sizeable and richer agent-based, stock-flow consistent model structures (with many behavioral economic model elements), the basic points we aim to highlight about vanishing funding needs in case the bank population shrinks to a singular bank (and the CB losing its handle on economic dynamics), is confirmed.
