Discussion on ’Information and Liquidity’
by Lester, Postlewaite, and Write

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What the paper is about

Money search model a la Lagos and Wright with multiple assets which differ for their liquidity

Questions:

1. What are the equilibrium liquidity properties of these assets?

2. How monetary policy can affect assets’ returns, liquidity, allocation, and prices?
Results

- Monetary policy affects the return on money, **but also** the return on alternative assets that can be partial substitute for money.

- In particular, if inflation increases both the liquidity premium on money and that on less liquid assets increases.

- If the assets’ liquidity differential is endogenous, higher inflation can increase the liquidity of assets other than money.
Stripped down model

- Continuum of infinitely-lived agents and discrete time
- Each period agents participate to CM and to DM
- CM: centralized market where consumption good $x$ is produced using labor $h$ with $x = h$
- DM: *continuum of islands with competitive markets* where a different good $q$ is produced at cost $q$
- Competitive markets $\rightarrow$ no hold-up problem
Stripped down model (continued)

- there are two assets:
  1. **fiat money** with supply $M$ that grows at rate $\gamma$ (price $\phi$)
  2. **trees** in fixed supply $A$ which give return $\delta$ (price $\psi$)

- there are two types of islands:
  1. type 1: only money accepted for trade
  2. type 2: both assets accepted for trade

- CM: arrive with $y = \phi m + (\delta + \psi) a$ and choose $(\hat{m}, \hat{a})$

- $W(y) =$ value function of agent entering CM

- $V(m, a) =$ value function of agent entering DM
Centralized Market

\[ W(y) = \max_{x,h,\hat{m},\hat{a}} \{ U(x) - h + \beta V(\hat{m}, \hat{a}) \} \]
\[ s.t. \; x = h + y - \phi \hat{m} - \psi \hat{a} - T \]

FOC:

\[ U'(x) = 1 \]
\[ \phi \geq \beta V_1(\hat{m}, \hat{a}), \quad \text{with} = \text{if} \; \hat{m} > 0 \]
\[ \psi \geq \beta V_2(\hat{m}, \hat{a}), \quad \text{with} = \text{if} \; \hat{a} > 0 \]

Result: \( W(y) = k + y \) for some \( k > 0 \)
Decentralized Market

Seller in island $i$:

$$\max_{q_i} -q_i + W(\tilde{y} + p_i q_i)$$

Buyer in island $i$:

$$\max_{q_i} u(q_i) + W(y - p_i q_i)$$

subject to $q_i \leq y_i$

where $y_1 = \phi m$ and $y_2 = \phi m + (\delta + \psi) a$

Hence:

$$p_1 = p_2 = 1 \text{ and } q_i = \begin{cases} q^* \text{ if } y_i \geq q^* \\ y_i \text{ if } y_i < q^* \end{cases}$$

where $q^* = u^{-1}(1)$
In summary

Understanding liquidity

Three Regimes

Endogenous Liquidity

Decentralized Market (continued)

\[ V(m,a) = \lambda_0 W(y) + \lambda_1 [u(q_1) + W(y - q_1)] + \lambda_2 [u(q_2) + W(y - q_2)] \]

Hence:

\[ V_1(m,a) = \phi \left[ 1 + \lambda_1 (u'(q_1) - 1) + \lambda_2 (u'(q_2) - 1) \right] \]
\[ V_1(m,a) = (\delta + \psi) \left[ 1 + \lambda_2 (u'(q_2) - 1) \right] \]

- \( u'(q_i) - 1 \) represents the liquidity premium associated to assets traded in islands of type \( i \)

- Notice that \( u'(q_i) = 1 \) iff \( y_i \geq q^* \), \( u'(q_i) > 1 \) otherwise
Steady State

In steady state it must be that \( m = M, \ a = A, \) and \( \phi / \hat{\phi} = \gamma. \)

The prices \((\phi, \psi)\) are determined by

\[
\phi = \beta \hat{\phi} \left[ 1 + \lambda_1 (u'(q_1) - 1) + \lambda_2 (u'(q_2) - 1) \right] \\
\psi = \beta (\delta + \hat{\psi}) \left[ 1 + \lambda_2 (u'(q_2) - 1) \right]
\]

There can be **3 types of equilibria:**

1. \( y_2 \geq y_1 \geq q^* \) with \( u'(q_1) = u'(q_2) = 1 \)
2. \( y_2 \geq q^* > y_1 \) with \( u'(q_1) > u'(q_2) = 1 \)
3. \( q^* > y_2 > y_1 \) with \( u'(q_1) > u'(q_2) > 1 \)
Friedman rule

Look for equilibrium of type 1:

\[
\begin{align*}
\phi &= \beta \hat{\phi} \Rightarrow \gamma = \beta \\
\psi &= \beta (\delta + \hat{\psi}) \Rightarrow \psi = \frac{\beta}{1 - \beta} \delta
\end{align*}
\]

In this equilibrium

\[\phi M \geq q^*\]

This type of equilibrium exists only under the **Friedman rule**!
Scarce money and Abundant Trees

Look for equilibrium of type 2:

\[
\phi > \beta \hat{\phi} \Rightarrow \gamma > \beta
\]

\[
\psi = \beta (\delta + \hat{\psi}) \Rightarrow \psi = \frac{\beta}{1 - \beta} \delta
\]

Check:

\[
\phi M < q^*
\]
\[
\phi M + (\delta + \psi) A > q^*
\]

Result: \(\phi M\) decreases with \(\gamma\)

1. \(\gamma \to \beta\) then this equilibrium exists even if \(A\) is small
2. \(\gamma \to \infty\) then we need high \(A\)!
Scarcemoney and Trees

Look for equilibrium of type 3:

\[ \phi > \beta \hat{\phi} \Rightarrow \gamma > \beta \]

\[ \psi > \beta (\delta + \hat{\psi}) \Rightarrow \psi > \frac{\beta}{1 - \beta} \delta \]

Check:

\[ \phi M < q^* \]

\[ \phi M + (\delta + \psi)A < q^* \]

Result: \( \phi M \) decreases and \( \psi \) increases with \( \gamma \)
Liquidity premium

- Liquidity premium on money:
  \[
  \frac{\phi}{\hat{\phi} \beta} - 1
  \]

- Liquidity premium on trees:
  \[
  \frac{\psi}{(\hat{\psi} + \delta)\beta} - 1
  \]
Monetary policy

In summary
Understanding liquidity

Three Regimes

Endogenous Liquidity

γ

β

q₁,q₂

liquid.

premia

money

tree

0

q*

island 2

island 1

Type I

Type II

Type III
Endogenous liquidity

- Imagine buyers can pay a cost to be able to recognize good trees, and hence accept payments with both assets.

- Result: as inflation increases, agents substitute trees for money and the mass of buyers who accept trees increases.

- In the basic model, higher inflation increases the distortion in both islands.

- **Question:** can higher inflation reduce the average distortion? The distortion in islands 2?