



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Inside Money and Liquidity

Citation for published version:

Hardman-Moore, J & Kiyotaki, N 2013, *Inside Money and Liquidity*..

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Early version, also known as pre-print

Publisher Rights Statement:

© Hardman-Moore, J., & Kiyotaki, N. Inside Money and Liquidity

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Inside Money and Liquidity

Nobuhiro Kiyotaki and John Moore

1 Question

Under what environment, is the circulation of inside money essential for smooth running of the economy?

How does the financial deepening interwine with economic development?

We focus on two aspects of limited commitment

Bilateral: Debtor may default to the original creditor → borrowing constraint

Multilateral: Debtor may default to the new lenders → limited resaleability

2 Framework

A homogeneous, perfectly storable good at each date

A continuum of agents (population size 3)

$$U_t = \ln c_t + \beta \ln c_{t+1} + \beta^2 \ln c_{t+2} + \dots$$

Production technology:

Input at date t : $G(y) = \gamma y^{\frac{1}{1-\lambda}} \rightarrow y$: Output at date $t+2$
where $\lambda \in (0, 1)$

The agent are fully engaged throughout production

There is fiat money of fixed supply

First Best Steady State Allocation:

Each agent repeats 3-periods cycle of investing, growing, and harvesting

Each of population size one invests $G(y^*)$ every period:

$$G'(y^*) = \beta^2$$

Each agent consumes c^* every period:

$$c^* = \frac{1}{3}[y^* - G(y^*)]$$

Borrowing constraint: the agent can commit to repay only up to θ fraction of output from the present investment

Resaleability constraint: each project comprises large number of parts & a fraction α will fail. After investment, the original creditor privately learns which part will fail & the failing part can be separated

→ For a large enough $\alpha > \frac{1-\beta^3}{1+\beta^3}$, regular (blue) paper cannot be resold at $t+1$ because of "lemons" problem

$z \leq y$ fraction of projects can be bundled at additional cost $[(1-\phi)/\phi]G(z)$, where $0 < \phi < 1$ → special (red) paper backed by the bundled parts can be resold at $t+1$

q_t, n_t : price and quantity of newly issued illiquid blue paper

p_t, m_t : price and quantity of liquid red paper to mature in the next period

Flow-of-funds constraints for investing, growing (') and harvesting (") agents:

$$G(y_{t+2}) + \frac{1 - \phi}{\phi} G(z_{t+2}) + c_t + p_t m_t + q_t n_t \\ = p_t p_{t+1} \theta z_{t+2} + q_t \theta (y_{t+2} - z_{t+2}) + m''_{t-1} + n'_{t-2}$$

$$c'_{t+1} + p_{t+1} m'_{t+1} + q_{t+1} n'_{t+1} = m_t + n''_{t-1}$$

$$c''_{t+2} + p_{t+2} m''_{t+2} + q_{t+2} n''_{t+2} = (1 - \theta) y_{t+2} + m'_{t+1} + n_t$$

Symmetric Equilibrium

$$y_t = c_t + c'_t + c''_t + G(y_{t+2}) + \frac{1 - \phi}{\phi} G(z_{t+2})$$

$$\theta(y_{t+2} - z_{t+2}) = n_t + n'_t + n''_t$$

$$p_t \theta z_{t+2} + \theta z_{t+1} \leq m_t + m'_t + m''_t, \text{ where}$$

= holds and fiat money has no value if $p_t < 1$

fiat money may have value if $p_t = 1 \rightarrow$ can be $<$

We examine the steady state equilibrium

Proposition 1: The first best allocation $y = y^*$, $z = 0$, $c = c' = c'' = c^*$, can be achieved as a symmetric, steady-state equilibrium if and only if

$$\theta \geq \theta^* \equiv \frac{1}{3} \left[2 - \frac{\lambda \beta^2 (1 + 2\beta^2)}{1 + \beta^2 + \beta^4} \right]$$

Proposition 2: If $\theta < \theta^*$, then the economy exhibits the liquidity shortage:

borrowing constraints bind for investing agents

consumption is jagged: lowest when invest, and highest when harvest

investment and output are lower than the first best

$$\frac{1}{p} < \frac{1}{\sqrt{q}} < \frac{1}{\beta}$$

Equilibrium with valued fiat money exists if $\theta < \hat{\theta}(\phi) < \theta^*$

Region I: A Cash-Based Economy

Region II: An Economy with Specialized Financial Markets

Region III: An Economy with Gross Financial Positions





