A Framework for Analyzing Monetary Policy in an Economy with E-Money

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[1]The analysis and conclusions set forth are those of the authors and do not indicate concurrence by the Bank of Canada.

Introduction

- Central banks consider issuing a central bank digital currency
- One motivation is to maintain monetary sovereignty
  - ability to conduct monetary policy
- Concern that monetary sovereignty can be undermined by
  - declining cash use
  - increasing adoption of private e-money (digital currency)

This Paper

- Study the effects on monetary policy
  - if a private e-money is widely adopted
  - and the use of central bank money declines
- Assess whether and how a CBDC can help
- Focus on a policy game between CB and the e-money issuer
  - CB maximizes welfare
  - e-issuer maximizes profit

Findings

- A private e-money affects monetary policy
  - changes the set of possible policies
  - changes the optimal policy if the use of CB money declines
- If use of CB money is low
  - CB runs high inflation to encourage e-money usage
  - private issuer responds by raising its inflation
  - equilibrium is far away from the first best
- CB can avoid this by maintaining the use of its money
  - A CBDC can help to achieve the first best

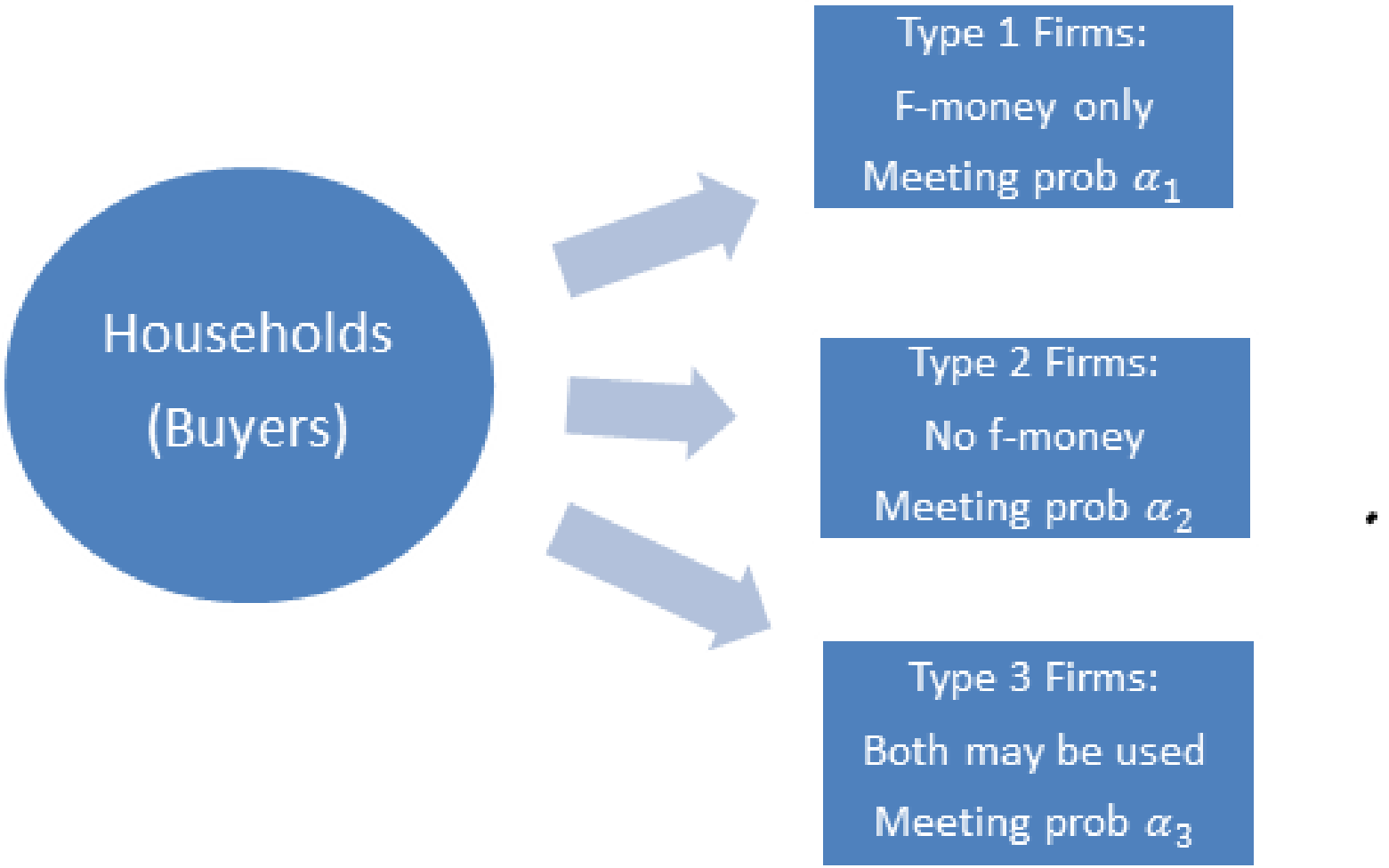
Model

- Discrete time, infinite horizon
- A continuum of households and a continuum of firms
- Two intrinsically worthless durable objects
  - f-money issued by CB
  - e-money issued by a private issuer

Benchmark Model

- Households want to consume y and randomly meet firms
- Firms produce y good on spot
- Three types of firms differing in money they accept

Type of Meetings



Steady State Equilibrium

- π^m and π^h be the inflation rates for f-money and e-money
- $i^m = (1+\pi^m)/\beta - 1$, $i^h = (1+\pi^h)/\beta - 1$,
- Total real value of fiat and e-money z^m and z^h satisfy

$$i^m \geq \alpha_1 \lambda(z^m) + \alpha_3 \lambda\left(z^m + z^h\right), \; z^m = 0 \text{ if strict inequality}$$

$$i^h \geq \alpha_2 \lambda\left(z^h\right) + \alpha_3 \lambda\left(z^m + z^h\right), \; z^h = 0 \text{ if strict inequality}$$

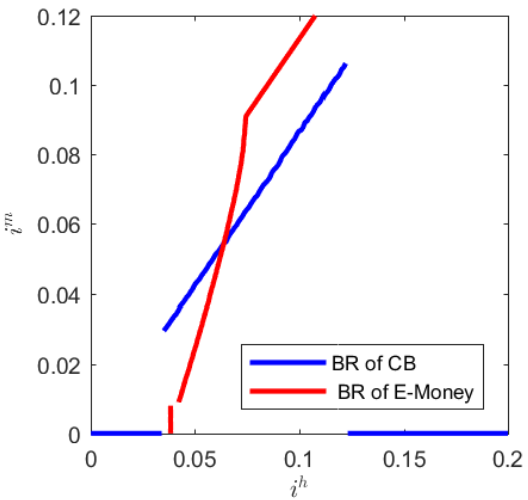
where λ is the liquidity premium.

- For fiat money to be valued, $i^m \leq \alpha_1 \lambda(0) + \frac{\alpha_3}{\alpha_1+\alpha_3} i^h$.

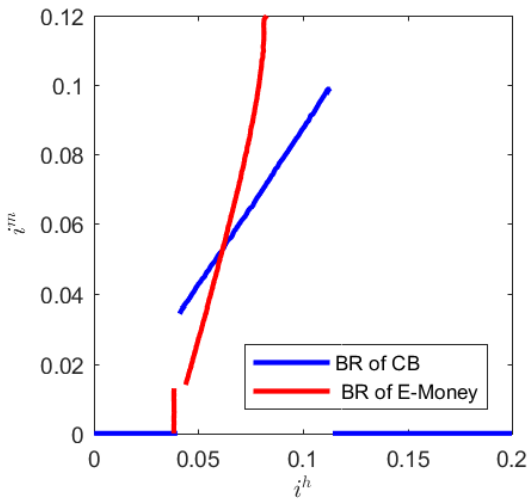
Policy Rates Setting Game

- E-issuer set π^h / i^h to maximize profit
- CB set π^m / i^m to maximize total welfare
- CB and private issuer play a simultaneous move game
  - stage 1: they both announce long run rates
  - stage 2: the economy figures out the equilibrium
- First best achieved at $i^m = i^h = 0$

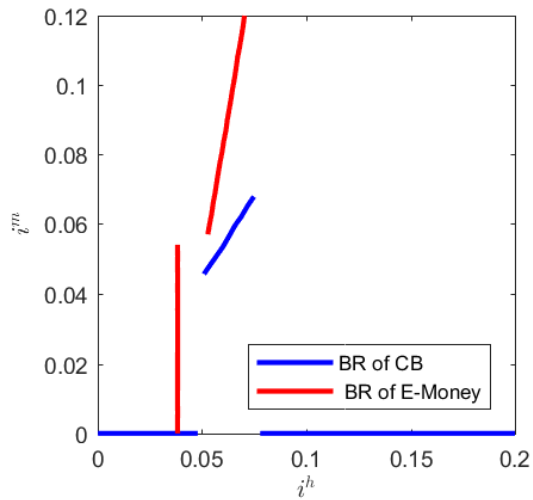
Equilibrium



(a) Low α_1



(b) Medium α_1



(c) High α_1

Central Bank Digital Currency

- High use of CB money is a commitment device
  - not to strengthen the market power of the e-issuer
- Issuing a CBDC that serves type 2 meetings leads to first best
- In practice, reduces the incentive for the CB to help e-issuer

Conclusion

- E-money can affect CB policy
  - restrict the set of policies
  - change optimal policies if use of CB money declines
  - lower welfare
- Important to maintain the use of CB money
  - a CBDC can help to achieve a better equilibrium