Financial Innovations in a World with Limited Commitment: Implications for Inequality and Welfare

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large literature exist on the positive relationship between an economy's financial innovation and economic growth

- enhancement of productivity and reduction of friction (eg. Greenwood and Jovanovic (1990), Boyd and Prescott (1986), Allen (1990), Ramakrishnan and Thakor (1984))
- However, in economies with incomplete markets, innovations can be costly in terms of welfare (eg. Hart (1975) and Elul (1995)) and destabilizing (Brock, Hommes, and Wagener (2009))

- Question: Do financial innovations affect welfare and consumption inequality?
- Two Types of Innovations: Increased access to banking services and increase in quality (pledgeability) of collateral

Motivation: how has the payment system evolved

- financial access has increased over time
- the fraction of people "unbanked" has been declining over time

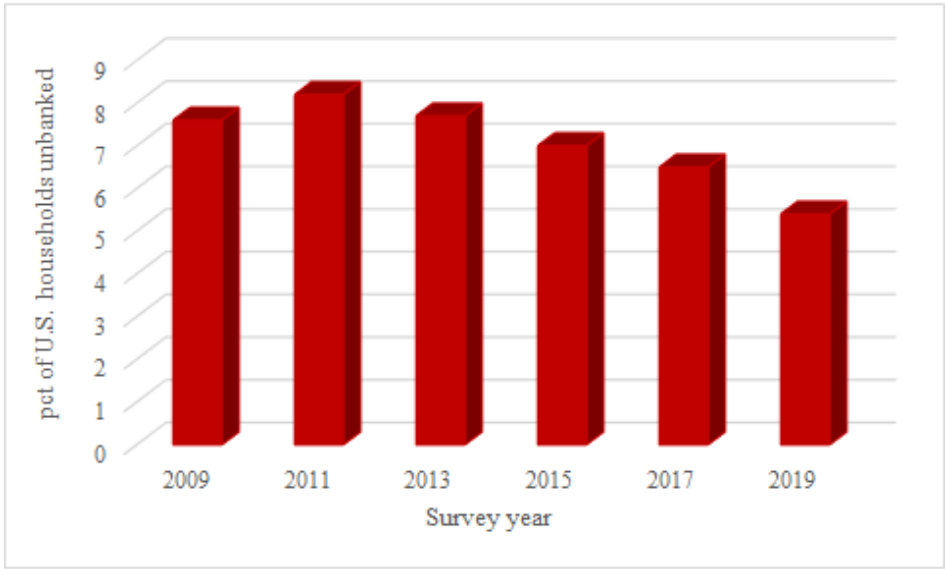

Figure: Percentage of households not using bank accounts

Motivation: New or better financial instruments being traded

- repurchase agreements and other secured credit arrangements are increasingly used

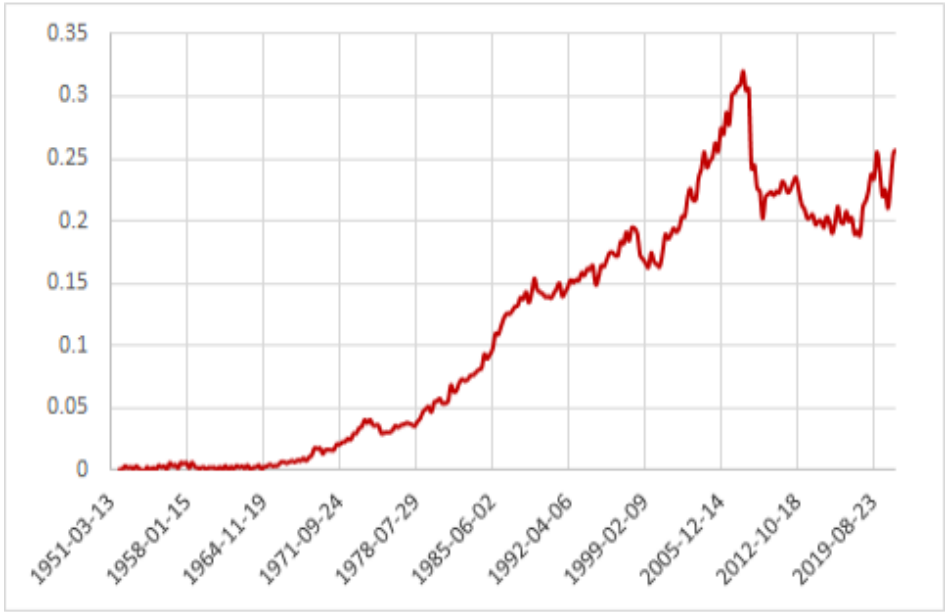

Figure: Repos as a fraction of GDP in the US

Three key features

1. the analysis is set in an economy in which the payment system plays a central role
2. limited commitment problem creates a need for collateral
3. frictional and incomplete market

Our findings are summarized as follows:

- Experiment 1: Greater financial access
- intensive and extensive margins are at work
- extensive margin: more consumption for those with new access
- intensive margin: less consumption for those already banked, but more people using deposits
- numerical analysis shows a decline in expected welfare and less consumption inequality
- there exists an accommodating fiscal policy that increases collateral (govt debt) to match the increase along the extensive margin

Our findings are summarized as follows:

- Experiment 2: increase in quality/pledgeability of collateral (smaller haircuts)
- greater consumption for those using banks: only intensive margin
- welfare and consumption inequality increases

The model economy is similar to Dhital, et al 2021

- discrete time $t = 0, 1, 2,$
- 3 subperiods: morning, afternoon, and evening each date
- DM (morning) and CM (afternoon and evening)
- buyers, sellers, bankers, and government
- two types of sellers: connected and unconnected
- connected sellers can verify buyer's bank deposit holdings in DM, unconnected cannot, so only money is accepted.

DM or afternoon

- a specialized (DM) good is produced, consumed and traded in a frictional market
- market characterized by search and bilateral matches

Afternoon (CM)

- Walrasian markets: production and consumption, asset market and deposit in bank
- sellers: use claims against deposits (if any) to collect proceeds of sales from the banks
- buyers: realization of trading shock: probability ρ matched with an unconnected seller in next DM
- evening (CM): withdrawal decision by buyer

Three stores of values

- money [price is represented by ϕ_t]
- short-term government bond [price z_t^s, paying 1 unit of money next period]
- long-term (consol) government bond [price z_t^l, paying one unit of money each period]
- government bonds are book entries and records are only available in CM

banker:

1. collects deposits
2. use proceeds to buy money and government bonds
3. but can abscond

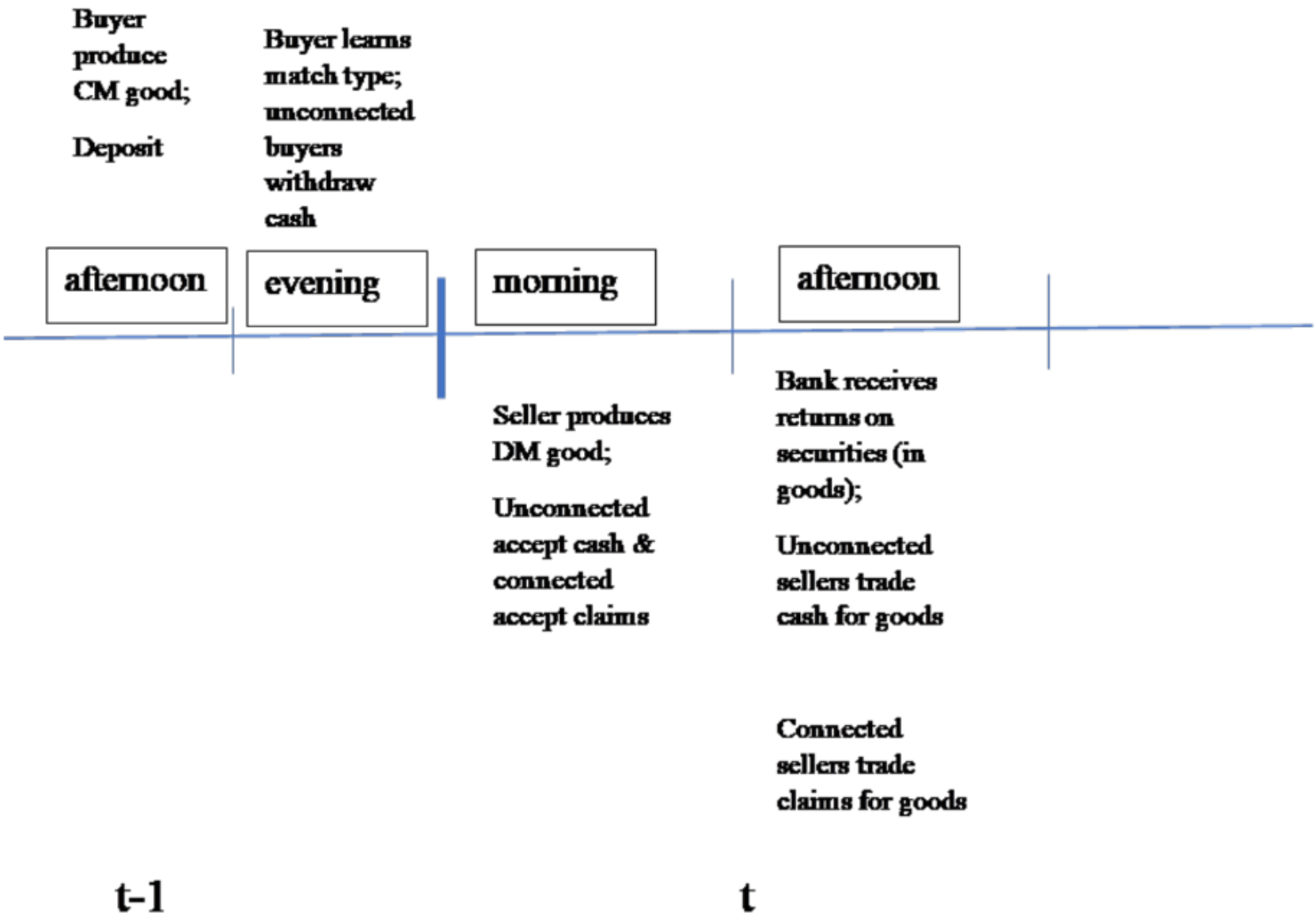

Figure: Summary timeline of actions

Bankers only operate in the CM
Compete by maximizing expected welfare of buyers

$$\mathcal{U}_t = -d_t + \beta \left[\rho \, u\Big(q^u_{t+1}(m_t) \Big) + (1-\rho) \, u\big(q_{t+1}(n_t)\big) \right], \tag{1}$$

s. t. balance sheet, incentive compatibility and government budget constraints

$$d_t - \rho m_t - z^s_t b^s_t - z^l_t b^l_t - (1-\rho) R_t n_t + \frac{\phi_{t+1}}{\phi_t} b^s_t + \frac{\phi_{t+1}}{\phi_t} b^l_t (1 + z^l_{t+1}) = 0, \tag{2}$$

$$- (1-\rho) R_t n_t + \frac{\phi_{t+1}}{\phi_t} b^s_t (1-\theta_s) + \frac{\phi_{t+1}}{\phi_t} b^l_t (1 + z^l_{t+1})(1-\theta_l) \geq 0, \tag{3}$$

$$\phi_t \Big(M_t - M_{t-1} + z^s_t B^s_t - B^s_{t-1} + z^l_t B^l_t - (z^l_t + 1) B^l_{t-1} \Big) - \tau_t = 0 \tag{4}$$

Definition: For given monetary policy, a stationary monetary equilibrium is a set of CM and DM consumption bundles x, q^u, q, real money balances and real bond holdings $m, b^s, b^l,$, deposits, claims against deposits, return on deposits and prices d, n, R, z^s, z^l that are constant over time and satisfy the agents' optimization problems, market clearing conditions and the government budget constraint.

Lemma: The quantity consumed by buyers in connected trades is inversely related to ρ
This is the intensive margin

With plentiful collateral (shadow value of IC constraint is zero)
Proposition: If there is a decrease in the measure of unconnected sellers, then buyer's expected welfare and consumption increases. The extensive margin!
Note: Absence of limited commitment means intensive margin is shut

With a positive shadow value for collateral (scarce collateral): Proposition: A positive financial innovation in the form of a smaller measure of DM buyers in unconnected trades has an indeterminate effect on (i) expected welfare; and (ii) consumption inequality. Because the intensive margin counteracts the extensive margin.

Numerical results on consumption by connected buyers eqm quantity with changes in ρ

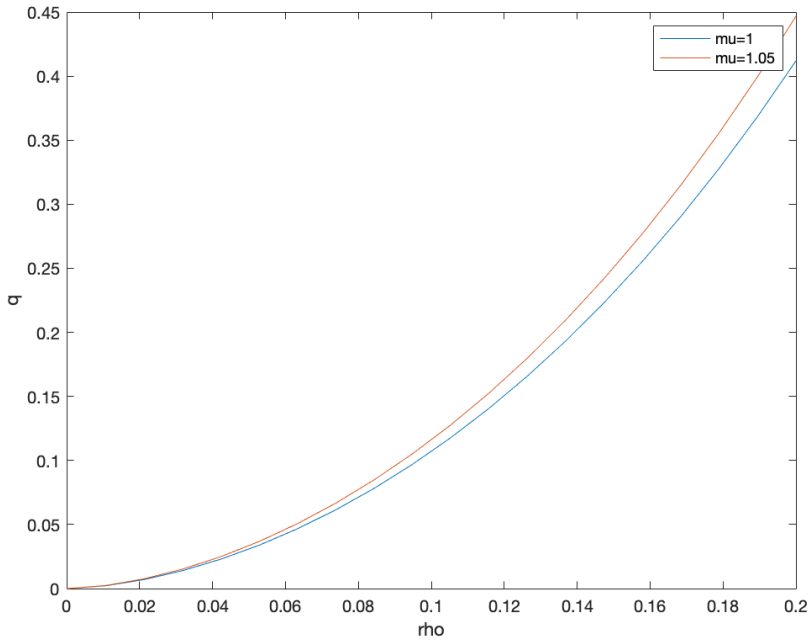

Figure: Welfare for varying ρ

And numerical results with respect to inequality

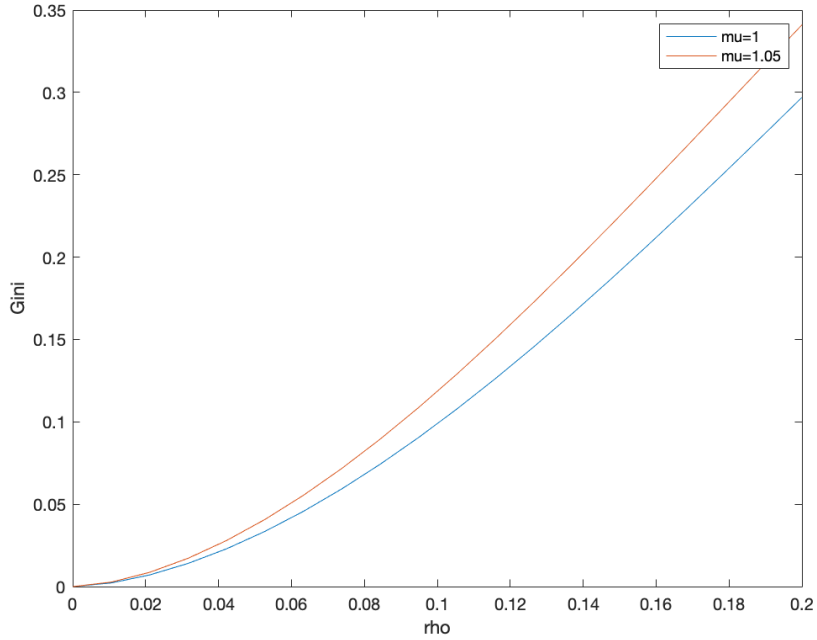

Figure: Gini coefficients for varying ρ

Is there a way to "fix" the impact?

Lemma

Open market sale–or, decrease in money-to-bond ratio, δ–can supply enough additional collateral to mitigate the effects of the intensive margin.

Proposition: In an experiment in which there is a financial development resulting in a larger share of connected matches in the DM market, there exists a decrease in the money-to-bond ratio, δ^*, such that the quantity consumed by buyers in that DM market unchanged.

With positive shadow value for haircuts Proposition: For a change in the fraction of long-term government debt that can be absconded (a change in θ_l), the results are as follows:

- consumption in connected trades, q, is inversely related to θ_l;
- expected welfare is inversely related to θ_l;
- consumption inequality is inversely related to θ_l

One modification:

- seller receives random draw $\kappa \geq 0$, where κ is the fixed cost of acquiring deposit information
- endogenous ρ that solves an optimal stopping rule

With positive shadow value of collateral:

- Let $F_0(\kappa)$ FSD $F_1(\kappa)$, then
  - $\rho \downarrow$, $q \downarrow$, Gini $\downarrow$, welfare $\downarrow$

  Note however: $q \downarrow \Rightarrow \rho \uparrow$, so effect is diminished

with smaller haircut

- $\rho \downarrow$, $q \uparrow$, Gini $\uparrow$, welfare $\uparrow$

if shadow value is zero:

- then with $F_0(\kappa)$ FSD $F_1(\kappa)$, we get $\rho \downarrow$, Gini $\uparrow$ and welfare $\uparrow$

smaller haircut has no effect on eqm quantities

Objective is to study how financial access and other financial innovations affect economies in which the payment system is highlighted; the economy is plagued by limited commitment and hence collateral is a key mechanism

- the shadow value of collateral plays a critical role; when collateral is plentiful, financial access operates through an extensive margin $\Rightarrow$ greater access is good, smaller haircuts produce no changes
- with scarce collateral, however, there is an intensive margin that numerically dominates extensive margin $\Rightarrow$ improved access reduces expected welfare and inequality
- deeper point: in our model, limited commitment is driving a decline in expected welfare
  collateral is a mechanism that helps to illuminate the contrasting predictions made by researchers regarding the costs and benefits of financial innovation