Financial Intermediary Capital

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Needed: A Theory of Financial Intermediary Capital

Question

- How does intermediary capital affect financing & macroeconomic activity?

Needed

- A dynamic theory of financial intermediary capital

Motivation

- Financial crisis and its aftermath – capitalization of financial intermediaries is arguably critical for economic fluctuations and growth
Our Theory of Financial Intermediary Capital

- **Financial intermediaries have a collateralization advantage relative to households**

- Intermediaries better able to collateralize claims than households

- Firms need to collateralize claims to borrow from intermediaries and households – firms need net worth since collateral constraints limit financing

- Financial intermediaries require net worth as their ability to refinance their collateralized loans from households is in turn limited - intermediaries need to collateralize their promises.
Economy with limited enforcement and limited participation

- Two sub periods
  - Morning: cash flows realized; more \( \theta_i \) capital collateralizable
  - Afternoon: investment/financing; only fraction \( \theta < \theta_i \) collateralizable

- Limited participation with two types of lenders
  - Households present only in afternoons; intermediaries always

- Optimal contract implemented with two sets of one-period Arrow securities (for morning and afternoon)
Collateral and Financial Intermediation – Synopsis

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  - Intermediaries need to finance morning claims out of own net worth
  - Intermediated finance is short term
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- **Role for intermediary capital**
  - Economy with two state variables: firm and intermediary net worth
Our Theory of Financial Intermediary Capital

- **Two state variables**
- The net worth of both firms and intermediaries thus plays an important role in our model.
- These two state variables jointly determine the dynamics of economic activity, investment, financing, and loan spreads.

- Relatively slow accumulation of intermediary net worth relative to firm net worth
Compelling dynamics

- When corporate sector is very constrained,
  - ... intermediaries “hold cash” at low interest rates
- When intermediaries are very constrained,
- firms’ investment stays low even as firms pay dividends
Equilibrium Spread on Intermediated Finance

- Unless the intermediary sector is “parking” capital with the intermediary sector, interest rate on intermediated finance is above the household interest rate, thus there is a spread on intermediated finance over household finance.

- Equilibrium spread on intermediated finance increases in the amount of intermediary capital

- Equilibrium spread on intermediated finance can increases or decrease in firm capital – two different effects

- Firms’ investment goes up, lowering firms’ levered marginal product, hence lowering the demand for intermediated finance and hence the equilibrium spread.

- Firm’s investment goes up, increasing the amount of collateralizable assets, hence increasing the demand for intermediated finance and hence the equilibrium spread.
Recent Empirical Evidence on Crisis

- Reinhart and Rogoff (2014) and related literature

- Tentative and halting nature of recoveries from crises

- Consistent with key **stylized facts about macro downturns with credit crunch**

  - **Fact 1: Severity**
    - Downturns associated with financial crises are more severe

  - **Fact 2: Protractedness** ("halting, tentative... recoveries")
    - Recoveries from financial crises are protracted and often tentative

  - **Fact 3: Severity of credit crunch affects severity/protractedness**
    - The severity of the financial crises itself affects the severity and protractedness of the downturn
Our Model’s Implications

- Recoveries from a credit crunch are slow due to the slow accumulation of intermediary capital.
- Recoveries from financial crises are protracted and often tentative and halting – the need for intermediaries to catch up results in the tentative and halting nature of the recovery.
- The severity of the financial crises itself (here the drop in intermediary wealth) affects the severity and protractedness of the downturn and subsequent recovery.
- Bank dependent economies (where more of a given fraction of collateral comes from banks) are more severely affected by a financial crisis, the recovery is also even more protracted and halting.
Literature: Models of Financial Intermediaries

- **Intermediary capital**
  - Holmström/Tirole (1997) – need capital at stake to commit to monitor
  - Diamond/Rajan (2000), Diamond (2007) – ability to enforce claims due to better monitoring

- **Other theories of financial intermediation - no role for capital**
  - Coalition based theories – Townsend (1978), Boyd/Prescott (1986)
Literature: Dynamic Models with Net Worth Effects

- **Firm net worth**
  - Bernanke/Gertler (1989), Kiyotaki/Moore (1997a)

- **Intermediary net worth**
  - Gertler/Kiyotaki (2010), Brunnermeier/Sannikov (2014)

- **Firm and intermediary net worth**
  - This paper
Model: Environment

- Discrete time
- Infinite horizon
- 3 types of agents
  - Households
  - Financial intermediaries
  - Firms
Model: Households

- Risk neutral, discount at $R^{-1} > \beta$ where firms’ discount rate is $\beta$
- Large endowment of funds (and collateral) in all dates and states
Model: Financing Subject to Collateral Constraints

- **Collateral constraints**
  - Complete markets in one period ahead Arrow securities
    - subject to collateral constraints
  - Firms can issue state-contingent promises
    - ... up to fraction $\theta$ of resale value of capital to households
    - ... up to fraction $\theta_i$ of resale value of capital to intermediaries
  - Related: Kiyotaki/Moore (1997a); but two types of lenders and allow risk management

- **Limited enforcement**
  - We derive such collateral constraints from limited enforcement without exclusion - different from Kehoe/Levine (1993)
  - Related: Rampini/Viswanathan (2010, 2013)
Model: Financial Intermediaries

- Risk neutral, discount at $\beta_i \in (\beta, R^{-1})$

- **Collateralization advantage relative to households**
  - Ability to seize up to fraction $\theta_i > \theta$ of (resale value of) collateral

- **Refinancing collateralized loans**
  - Idea: Intermediaries can borrow against their (collateralized) loans
    - ... but only to extent households can collateralize assets backing loans
  - Households can collateralize up to $\theta$ of collateral backing loans ("structures")
  - Intermediaries need to finance $\theta_i - \theta$ out of own net worth ("equipment")
Capital, collateral value, and financing
Model: Representative Firm (or “Corporate Sector”)

- Risk neutral, limited liability, discount at $\beta < 1$

- Capital $k$
  - Depreciation rate $\delta$; no adjustment costs

- Standard neoclassical production function
  - Cash flows $A'f(k)$ where $A' \equiv A(s')$ is (stochastic) Markov productivity with transition probability $\Pi(s,s')$
  - Strictly decreasing returns to scale ($f(\cdot)$ strictly concave)

- Two sources of outside finance
  - Households
  - Financial intermediaries
Firm’s Problem

- Firm solves following dynamic program

\[
v(w, Z) = \max_{\{d, k, b', b'_i, w'\} \in \mathbb{R}_+^2 \times \mathbb{R}^S \times \mathbb{R}_+^{2S}} d + \beta E [v(w', Z')] \tag{1}
\]

subject to budget constraints

\[
w + E[b' + b'_i] \geq d + k \tag{2}
\]

\[
A' f(k) + k(1 - \delta) \geq w' + Rb' + R'_i b'_i \tag{3}
\]

and two types of collateral constraints

\[
\theta k(1 - \delta) \geq Rb' \tag{4}
\]

\[
(\theta_i - \theta) k(1 - \delta) \geq R'_i b'_i \tag{5}
\]

- State-contingent interest rates $R'_i$ determined in equilibrium
Firm’s Problem: Comments

- Two sets of state-contingent collateral constraints restricting
  - ... borrowing from households $b'$
  - ... borrowing from financial intermediaries $b_i'$

- **State variables:** net worth $w$ and state of economy $Z = \{s, w, w_i\}$
  - Net worth of representative firm $w$ and intermediary $w_i$
Characterization of Firm’s Problem

- Multipliers
  - ... on (2) through (5): $\mu, \Pi(Z, Z')\beta\mu', \Pi(Z, Z')\beta\lambda'$, and $\Pi(Z, Z')\beta\lambda_i'$
  - ... on $d' \geq 0$ and $b_i' \geq 0$: $\nu_d$ and $\Pi(Z, Z')R_i'\beta\nu_i'$
  - (Redundant: $k \geq 0$ and $w' \geq 0$)

- First order conditions
  - $\mu = 1 + \nu_d$  \hspace{1cm} (6)
  - $\mu = E[\beta\mu'([A'f_k(k) + (1 - \delta)] + [\lambda'\theta + \lambda_i'\theta_i - \theta]) (1 - \delta)])$  \hspace{1cm} (7)
  - $\mu = R\beta\mu' + R\beta\lambda'$  \hspace{1cm} (8)
  - $\mu = R_i'\beta\mu' + R_i'\beta\lambda_i' - R_i'\beta\nu_i'$  \hspace{1cm} (9)
  - $\mu' = v'(w', Z')$  \hspace{1cm} (10)

- Envelope condition
  - $v'(w, Z) = \mu$
Intermediary’s Problem

- Representative intermediary solves

\[
v_i(w_i, Z) = \max_{\{d_i, l', l'_i, w'_i\} \in \mathbb{R}^{1+3S}_+} d_i + \beta_i E[v_i(w'_i, Z')] \quad (11)
\]

subject to budget constraints

\[
\begin{align*}
    w_i & \geq d_i + E[l'] + E[l'_i] \\
    Rl' + R'_i l'_i & \geq w'_i
\end{align*}
\quad (12, 13)
\]

- State-contingent loans to households \(l'\) and to firms \(l'_i\)
Characterization of Intermediary’s Problem

- **Multipliers**
  - ... on (12) through (13): \( \mu_i \) and \( \Pi(Z, Z') \beta_i \mu_i' \),
  - ... on \( d_i' \geq 0, l' \geq 0 \), and \( l_i' \geq 0 \): \( \eta_d \), \( \Pi(Z, Z') R_i \beta_i \eta_i' \), and \( \Pi(Z, Z') R_i' \beta_i \eta_i' \)
  - (Redundant: \( w_i' \geq 0 \))

- **First order conditions**

  \[
  \begin{align*}
  \mu_i & = 1 + \eta_d, \quad (14) \\
  \mu_i & = R_i \beta_i \mu_i' + R_i \beta_i \eta_i', \quad (15) \\
  \mu_i & = R_i' \beta_i \mu_i' + R_i' \beta_i \eta_i', \quad (16) \\
  \mu_i' & = v_i'(w_i', Z'), \quad (17)
  \end{align*}
  \]

- **Envelope condition**

  \[
  v_i'(w_i, Z) = \mu_i
  \]
Model with Limited Enforcement and Limited Participation

■ **Timing**
- Afternoon: repayments, investment, consumption
- Morning: cash flows, repayments

■ **Limited participation**
- Afternoon: Firms, intermediaries, and households present
- Morning: Firms and intermediaries present, not households

■ **Limited enforcement**
- Afternoon
  - Firms can abscond with cash flows and $1 - \theta$ of capital (not structures)
  - Intermediaries can abscond with funds paid in morning
- Morning
  - Firms can abscond with cash flows and $1 - \theta_i$ of capital (not structures and equipment)

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Financial Intermediary Capital
Limited Enforcement: Timeline

Current period

Afternoon

Consume \( d \)
Invest \( k \)

Payments
...from/to intermediaries
Borrow \( E[b'_i] + E[b'_a] \)
...from/to households
Borrow \( E[b'] \)

Next period

Morning

State \( s' \)
Cash flow \( A'f(k) \)

Afternoon

Repay \( R'_ib'_i \)
Repay \( Rb' \)

Net worth if firm defaults

\[ A'f(k) + (1 - \theta_i)k(1 - \delta) \]
Equivalence: Limited Enforcement & Collateral Constraints

- Loans against $\theta_i - \theta$ ("equipment") only enforceable in morning
  - Intermediaries must extend such loans
  - Loans must be repaid each morning (no rollover) – new model of short term intermediated finance

- Loans up to $\theta$ ("structures") enforceable in afternoon
  - Households extend such loans w.l.o.g.
  - Rollover possible

- Two equivalent implementations with collateral constraints
  - Direct implementation
    - Households lend to firms directly
  - Indirect implementation
    - Households lend to intermediaries
    - Intermediaries lend to firms and borrow from households against collateralized corporate loans
Limited Enforcement and Limited Participation – Timeline

- Limited participation by households affords intermediaries advantage

<table>
<thead>
<tr>
<th>Current period</th>
<th>Afternoon</th>
<th>Morning</th>
<th>Next period</th>
<th>Afternoon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consume (d)</td>
<td></td>
<td>State (s')</td>
<td>Cash flow (A'f(k))</td>
<td></td>
</tr>
<tr>
<td>Invest (k)</td>
<td></td>
<td>Repay (R_i'b_i)</td>
<td></td>
<td>Repay (Rb'_u)</td>
</tr>
<tr>
<td>Payments</td>
<td>Borrow (E[b'_i] + E[b'_a])</td>
<td>Repay (R_i'b_i)</td>
<td></td>
<td>Repay (Rb'_u)</td>
</tr>
<tr>
<td>...from/to intermediaries</td>
<td>Borrow (E[b'])</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>...from/to households</td>
<td></td>
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</tr>
<tr>
<td>Net worth if firm defaults</td>
<td></td>
<td>(A'f(k) + (1 - \theta_i)k(1 - \delta))</td>
<td>(A'f(k) + (1 - \theta)k(1 - \delta))</td>
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Endogenous Minimum Down Payment Requirement

- **Minimum down payment requirement** \( \varphi \) (or margin)
  - Borrowing from households only
    \[
    \varphi = 1 - R^{-1} \theta (1 - \delta)
    \]
  - Borrowing from households and financial intermediaries
    \[
    \varphi_i(R_i') = \varphi - E[(R_i')^{-1}] (\theta_i - \theta) (1 - \delta)
    \]

- **Firm’s investment Euler equation**
  \[
  1 \geq E \left[ \beta \frac{\mu'}{\mu} A' f_k (k) + (1 - \theta_i)(1 - \delta) \frac{\varphi_i(R_i')}{\varphi_i(R_i')} \right] \quad (18)
  \]
User Cost of Capital with Intermediated Finance

- Extension of Jorgenson’s (1963) user cost of capital definition

\[ u \equiv r + \delta \]

- User cost would be rental cost in frictionless economy

- Premium on internal funds \( \rho \): \( \frac{1}{R + \rho} \equiv E[\beta \mu'/\mu] \)

- Premium on intermediated finance \( \rho_i \): \( \frac{1}{R + \rho_i} \equiv E[(R'_i)^{-1}] \)

- **Firm’s user cost of capital** \( u \) is

\[ u \equiv r + \delta + \frac{\rho}{R + \rho} (1 - \theta_i)(1 - \delta) + \frac{\rho_i}{R + \rho_i} (\theta_i - \theta)(1 - \delta), \]

where \( 1 + r \equiv R \)
Premia on Internal and Intermediated Finance

- Internal and intermediated funds are scarce

- Proposition 1 (Premia on internal and intermediated finance)
  
  - *Premium on internal finance* $\rho$ (weakly) exceeds *premium on intermediated finance* $\rho_i$
    
    $$\rho \geq \rho_i \geq 0,$$

  - *Premia equal, $\rho = \rho_i$, iff $E[\lambda'_i] = 0$.*

  - *Premium on internal finance strictly positive, $\rho > 0$, iff $E[\lambda'] > 0$.***
Definition 1 (Equilibrium) An equilibrium is

- allocation $x \equiv [d, k, b', b'_i, w']$ (for firm) and $x_i \equiv [d_i, l', l'_i, w'_i]$ (for intermediary)
- interest rate process $R'_i$ for intermediated finance

such that

- (i) $x$ solves firm’s problem in (1)-(5) and $x_i$ solves intermediary’s problem (11)-(13)
- (ii) market for intermediated finance clears in all dates and states

$$l'_i = b'_i.$$ (19)
Essentiality of Financial Intermediation

- **Definition 2 (Essentiality of intermediation)**: Intermediation is **essential** if an allocation can be supported with a financial intermediary but not without.
  - Analogous: Hahn’s (1973) definition of essentiality of money

- **Intermediaries are essential**

- **Proposition 3 (Positive intermediary net worth)**: Financial intermediaries always have positive net worth in a deterministic or eventually deterministic economy.

- **Proposition 4 (Essentiality of intermediaries)**: In any deterministic economy, financial intermediaries are always essential.
  - Intuition: Without intermediaries, shadow spreads would be “high.”
Deterministic Steady State

- Steady state spread and intermediary capitalization

- Definition 3 (Steady state) A deterministic steady state equilibrium is an equilibrium with constant allocations, that is, \( x^* \equiv [d^*, k^*, b^*, b'_*, w'^*] \) and \( x_i^* \equiv [d_i^*, l'^*_i, l'_i, w'^*_i] \).

- Proposition 5 (Steady state) In steady state
  - Intermediaries essential; positive net worth; pay positive dividends
  - Spread on intermediated finance \( R'_i^* - R = \beta^{-1}_i - R > 0 \)
  - (Ex dividend) intermediary net worth (relative to firm’s net worth)
    \[
    \frac{w^*_i}{w^*} = \frac{\beta_i(\theta_i - \theta)(1 - \delta)}{\phi_i(\beta^{-1}_i)}
    \]
    (ratio of intermediary’s financing to firm’s down payment requirement)
Deterministic Equilibrium Dynamics

- Two main phases: no dividend phase and dividend phase

Definition 6 (Deterministic dynamics) Given $w$ and $w_i$, there exists a unique deterministic dynamic equilibrium which converges to the steady state characterized by a no dividend region (ND) and a dividend region (D) (which is absorbing) as follows: [Region ND] $w_i \leq w_i^*$ (w.l.o.g.) and $w < \bar{w}(w_i)$, and (i) $d = 0$ ($\mu > 1$), (ii) the cost of intermediated finance is

$$R'_i = \max \left\{ R, \min \left\{ \frac{(\theta_i - \theta)(1 - \delta)}{\varphi} \left( \frac{w}{w_i} + 1 \right), \frac{A' f_k \left( \frac{w + w_i}{\varphi} \right)}{\varphi} \right\} \right\}$$

(iii) investment $k = (w + w_i)/\varphi$ if $R'_i > R$ and $k = w/\varphi_i(R)$ if $R'_i = R$, and (iv) $w'/w'_i > w/w_i$, that is, firm net worth increases faster than intermediary net worth. [Region D] $w \geq \bar{w}(w_i)$ and (i) $d > 0$ ($\mu = 1$). For $w_i \in (0, \bar{w}_i)$, (ii) $R'_i = \beta^{-1}$, (iii) $k = \bar{k}$ which solves $1 = \beta \left[ A' f_k(\bar{k}) + (1 - \theta)(1 - \delta) \right]/\varphi$, (iv) $w'_ex/w'_i < wex/w_i$, that is, firm net worth (ex dividend) increases more slowly than intermediary net worth, and (v) $\bar{w}(w_i) = \varphi \bar{k} - w_i$. For $w_i \in [\bar{w}_i, w_i^*)$, (ii) $R'_i = (\theta_i - \theta)(1 - \delta)k/w_i$, (iii) $k$ solves

$$1 = \beta \left[ A' f_k(k) + (1 - \theta)(1 - \delta) \right]/(\varphi - w_i/k),$$

(iv) $w'_ex/w'_i < wex/w_i$, that is, firm net worth (ex dividend) increases more slowly than intermediary net worth, and (v) $\bar{w}(w_i) = \varphi_i(R'_i)k$. For $w_i \geq w_i^*$, $\bar{w}(w_i) = w^*$ and the steady state of Proposition 5 is reached with $d = w - w^*$ and $d_i = w_i - w_i^*$.
Joint Dynamics of Intermediary and Corporate Net Worth

\[ R_i^l = \beta_i^{-1} \]

\[ R_i^l > \beta_i^{-1} \]

\[ R_i^l > \beta^{-1} \]

\[ R_i^l \in (\beta_i^{-1}, \beta^{-1}) \]
Some Intuition for Proposition 5

- If both firms and intermediaries are constrained and neither pays a dividend

- Corporate loan demand exceeds intermediary net worth – collateral constraint is slack, the interest rate must equal the marginal levered return on capital

\[ R_i' = \frac{A' f_k \left( \frac{w+w_i}{\varphi} \right)}{\varphi} + (1 - \theta)(1 - \delta) \]  

(20)

- Collateral constraint binds, the collateral constraint determines the interest rate which is strictly less than the levered marginal product of capital

\[ R_{i'} = \frac{(\theta_i - \theta)(1 - \delta) \left( \frac{w}{w_i} + 1 \right)}{\varphi} \]  

(21)

- Corporate loan demand is much less than intermediary net worth – collateral constraint binds but intermediaries also save capital with households and the intermediary interest rate is \( R \).
Relatively slow accumulation of intermediary net worth in Region ND (no dividend)

- Intermediaries earn $R_i'$ which is at most marginal return on capital (and can be strictly less)
- Firms earn average return (decreasing returns to scale)
- Hence in this region firms grow faster than intermediaries
Lemma 2 (Initial intermediary dividend) The representative intermediary pays at most an initial dividend and no further dividends until the steady state is reached. If $w_i > w_i^*$, the initial dividend is strictly positive.

Intuition: Low firm net worth limits loan demand

- Intermediaries save only part of net worth to meet future loan demand
Region D: Firms pay dividends and intermediaries catch up

- Suppose firms pay dividends and the collateral constraint is slack.
- Intermediated interest rate must again equal marginal return on capital

\[
R'_{i} = \left( \beta \frac{\mu'}{\mu} \right)^{-1} = \beta^{-1} = \frac{A' f_{k}(\bar{k}) + (1 - \theta)(1 - \delta)}{\phi},
\]  

(22)

and we have used \( \mu = \mu' = 1 \).
- Investment is constant at \( \bar{k} \) and intermediaries accumulate net worth while firms gradually relever by paying dividends
- When the collateral constraint binds again, the intermediary interest rate falls below \( \beta^{-1} \) and both firms and intermediaries grow but intermediaries grow faster in this catch up phase until steady state is reached
Dynamics of a Downturn Without a Credit Crunch - shock to firm net worth

Unanticipated drop in firm (but not intermediary) net worth from steady state (say due to surprise drop in productivity $A'$) **Panel A:** Joint evolution of firm and intermediary net worth

**Panel B:** Interest rates, net worth, lending, and investment over time

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Dynamics of Downturn without Credit Crunch (Cont’d)

- Low firm net worth ⇒ drop in real investment $k = w/\phi_i(R)$
- Lack of collateral/low loan demand ⇒ spread on intermediated finance may fall
  - Intermediaries save at low interest rate $R_i' = R$ (lend to households) to meet future loan demand.
Dynamics of a Credit Crunch

- Unanticipated drop in intermediary net worth from steady state leads to a large increase in intermediary spreads on impact
- Investment drops
- Corporate sector grows faster, starts paying dividends
- Recovery stalls until intermediaries also catch up and accumulate net worth; firms relever by reducing net worth
- Eventually (long time), the collateral constraint binds again and the interest falls below $\beta^{-1}$ and both firm and intermediary net worth grow until steady state is reached
Dynamics of a Credit Crunch

Unanticipated drop in intermediary net worth $w_i$ from steady state

**Panel A:** Joint evolution of firm and intermediary net worth

**Panel B:** Interest rates, net worth, lending, and investment over time
Dynamics of Credit Crunch (Cont’d)

Dynamics of net worth, spread, and investment

Panel B1. Cost of intermediated finance

Panel B2. Firm and intermediary wealth

Panel B3. Intermediary lending

Panel B4. Investment

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Financial Intermediary Capital
Dynamics of a Credit Crunch (Cont’d)

- **Fact 2: Protractedness** – slow/delayed recovery

- **“Delayed or stalled recovery”** (until intermediaries accumulate sufficient capital)
  - Reinhart/Rogoff (2014): “halting, tentative nature of the post-crisis recoveries (even in cases where there is a sharp – but not sustained – growth rebound)”
  - Partial recovery until $R_i' = \beta^{-1}$ when firms reinitiate dividends
  - Corporate investment remains depressed at $\bar{k}$ as firms pay dividends and stop growing, waiting for intermediary capital to catch up

$$R_i' = \left(\frac{\beta \mu'}{\mu}\right)^{-1} = \beta^{-1} = \frac{A' f_k(\bar{k}) + (1 - \theta)(1 - \delta)}{\phi}$$

- Corporate deleveraging (and eventual releveraging when intermediaries catch up)
Effect of Severity of Credit Crunch

- Joint dynamics of firm and intermediary net worth

Fact 3: Impact of severity of financial crises; halting recovery – stalls
Severity of the Credit Crunch

- Moderate credit crunch slows the recovery and raises the spread on intermediated finance
- Corporate accumulation is slowed and corporations pays dividends later
- Recovery stalls
- Severe credit crunch amplifies these effects
- Spreads jump up over even $\beta^{-1}$ and the recovery is much slower and the stall is longer
- Intermediary lending remains low for a much longer period of time
Downturn with Credit Crunch – Bank-Dependent Economy

- Bank dependence: higher $\theta_i$

- More severe, more protracted, longer stalls; Europe/Japan?

Panel B1. Cost of intermediated finance

Panel B2. Firm and intermediary wealth

Panel B3. Intermediary lending

Panel B4. Investment

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Financial Intermediary Capital
Downturn with a Credit Crunch in Bank-Dependent Economy

- Severity of credit crunch has much higher impact initially itself
- Downturn is also more protracted with investment reduced, intermediated finance depressed and spreads elevated for longer.
- Intermediary net worth takes much longer to recover
- Corporate net worth temporarily accumulates substantially more net worth than it has in the steady state, again in an effort to substitute internal funding for the lack of intermediated finance
- Hence bank dependent economies downturns associated with a credit crunch will be more severe and protracted
Empirical Evidence

- Fact 1: Severity of downturns associated with financial crises – see Reinhart and Rogoff (2014), Krishnamurthy and Muir (2016), Cera and Saxena (2008), and others

- Fact 2: Slow recoveries after financial crises

  Reinhart and Rogoff (2014) state that “significant part of the costs of [systemic banking] crises lies in the protracted and halting nature of the recovery” (page 50).

  Moreover, they argue that “(t)he halting, tentative nature of the post-crisis recoveries (even in cases where there is a sharp but not sustained - is evidenced in the relatively high incidence of double dips (or secondary downturns before the previous peak is reached)” (page 52).

- Fact 3: Impact of severity of financial crises itself

  Krishnamurthy and Muir (2016) measure the severity of a crisis using the spread between high-yield and low-yield bonds, and conclude that “recessions in the aftermath of financial crises are severe and protracted” and that furthermore “the severity of the subsequent crisis can be forecast by the size of [changes in the spread]”
Conclusions

- Theory of intermediaries with collateralization advantage
  - Better ability to enforce claims
    - ... implies role for financial intermediary capital
  - Tractable dynamic model with (two types of) collateralized finance

- Dynamics of intermediary capital
  - Economic activity and spreads determined by firm and intermediary net worth jointly
  - Slow accumulation of intermediary net worth
  - Downturns associated with credit crunch are
    - (1) severe and (2) protracted (and “tentative”/“halting”)
    - and (3) severity of credit crunch affects severity & protractedness,