Intermediaries as Safety Providers

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\(^1\)The views expressed in this paper are solely those of the authors and no responsibility for them should be attributed to the Bank of Canada.
Demand for safe assets

- Evidence for a strong demand for safe assets
  - Stable share of safe assets over long periods of time (Gorton, Lewellen, Metrick, 2012)
  - Pure safety premium distinct from the liquidity premium (Krishnamurthy & Vissing-Jorgensen, 2012)

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Demand for safe assets

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- Intermediaries play a major role supply of safe assets
  - How does this private provision of safety work?
A theory of intermediation based on safety demand

Preferences for absolute safe reservation consumption

- Investors differ in their access to safety
- Intermediaries improve the safety allocation
- Safety by contract, no bailout or deposit insurance

Private provision of safety requires demandable debt

- Withdrawal option is required to complete the contract
- Needed to control conflict over risk
Time variation

- Lower public safety provision leads to high safety premium
- Higher private provision of safety
  - More lending
  - Larger scale of preventive runs
  - Also increasing intermediary leverage
- Consistent with recent evidence (KVJ, 2015)
Safety offers a distinct rationale for demandable debt

- No liquidity insurance (Diamond and Dybvig, 1983)
- No information asymmetry (Gorton and Pennacchi, 1990)
- No transaction value, money-likeness (Stein, 2012; KVJ, 2015)
Agency conflict

- **Different risk preferences** between intermediary and safety investors

- Demandable debt as a commitment device
  - Calomiris and Kahn (1991): not to abscond with funds
  - Diamond and Rajan (2001): to use relationship-specific skills
  - No runs in equilibrium
  - Here, runs **necessary** to liquidate under residual risk
A simple model of safety demand

- Three dates \( t = 0, 1, 2 \) and a single good
- Unit mass of investors endowed with unit wealth at \( t = 0 \)
- Demand for safety
  \[
  u(c_1, c_2) = \begin{cases} 
  c_1 + c_2 & \text{if } c_1 + c_2 \geq S \\
  \underline{u} & \text{if } c_1 + c_2 < S
  \end{cases}
  \]
  
  - risk-neutral once a subsistence level \( S > 0 \) obtained
  - suffer a large disutility \( \underline{u} \) below subsistence level
  - Investors always seek safety in equilibrium (consume at least \( S \))

- No demand for liquidity
Safe storage

- Each investor $i$ has an individual storage option at $t = 0$
  - yields a heterogeneous return $s_i \in [s_L, s_H]$ at $t = 2$
  - otherwise all agents identical

- Heterogeneity captures differences across investors in
  - access to storage options
  - exposure to theft or expropriation risk
  - wealth when scale economy (eg buy a house)

- No storage on behalf of others
The trouble with delegated storage

- Storage return not verifiable
- Any storage option requires setting aside an asset
- This hinders verifiability
  - Even a tiny risk exposure undermines safety provision
- Evidence: Premier Fund, MF Global
Risky investment

- Risky investment technology at $t = 0$

- Simple binary return and signal structure

- **Return** at $t = 2$
  - High state: $R > 1$ with probability $\gamma \in (0, 1)$
  - Low state: 0

- Early liquidation at $t = 1$ yields $\alpha \in (0, 1)$

- At $t = 1$, a precise **signal** may reveal the return at $t = 2$
  - with probability $\delta \in (0, 1)$ each, else residual risk
  - signal is non-verifiable
Discrete Signal Structure

Return at t=2

Interim state

Revelation at t=1?

Yes

No

1 - δ

1 - δ

1 - γ

γ

0

Δ

Δ

Δ

1 - δ

1 - δ

1 - δ

1 - δ
Continuous signal version

Driven by signal on lowest possible return
Investment and storage returns

\[ \gamma R > \alpha \]

\[ PV \equiv \gamma R + (1 - \gamma) \delta \alpha > s_H \]

\[ s_L \geq S > \alpha \]

- In \( RR \) state, continuing investment has higher NPV
  - an investor who has achieved safety would not liquidate

- Investment has a higher PV than storage

- Storage is better at providing safety than (liquidated) investment
  - Some storage is required to obtain safety
Autarky

- Portfolio choice between storage and investment
  - Either store a lot, invest the rest and never liquidate in \( RR \) state
  - Or store a little, and liquidate fully when required

- Define \( s^A \equiv \frac{PV}{\delta + (1-\delta)\gamma \frac{R}{\alpha}} \)

Proposition

The autarky portfolio allocation in storage is:

\[
x^A_i \equiv \bar{x}_i 1\{s_i \geq s^A\} + x_i 1\{s_i < s^A\}.
\]

with the liquidation rule \( l^A_i \equiv 1\{s_i < s^A\} \).
Autarky storage $x_i^A$

Return on storage $s_i^A$
First Best

- Maximize expected output subject to safety for all
- Low-return investors do not store, receive a safe transfer
  - backed by liquidating some investment
  - FB achieves more investment

Proposition

If there is enough mass on high-return investors, \( s^A \leq \bar{s} \), the first-best threshold storage return is \( s^{FB} = s^A \). Only high-return investors store:

\[
\chi_i^{FB} = \bar{x}_i \mathbf{1}\{s_i \geq s^{FB}\}
\]

Safety for other investors is achieved by liquidating a fraction 
\[ \ell(s^{FB}) \equiv \frac{SF(s^{FB})}{\alpha I(s^{FB})} \in [0, 1] \] of investment in the residual risk state.
When there are too few high-return investors

- safety provision by intermediary requires 100% liquidation
- less efficient storage is used
- marginal storage return falls as safety demand rises
First-best storage $x_i^{FB}$
Implementation FB by private contracting

- High safety return agents start intermediaries, offer a menu of contracts
  - junior long-term claim priced to match $PV$ of direct investment, face value $B_2$ at $t = 2$
  - demandable debt priced $(D_1, D_2)$ with $D_1 = D_2 \geq s_B$

- High-return investors store $\bar{x}_i$

- Low-return investors achieve safety with demandable debt

- both types invest residual in risky claim

- with residual wealth invested in risky claim
  - Note: even a senior long-term claim not safe in $RR$ state
Proposition

A menu of private contracts attains the FB allocation:

- demandable debt with face value $D_2 = D_1 = s^{FB}$;
- long-term debt with face value $B_2(s^{FB})$.

In the RR state all demandable debt is withdrawn, inducing partial liquidation and partial default on long-term debt.
Public provision of safety

- Effect of public provision of safety
- Either on net $S$ or on storage return
  - Let it shift all storage returns down: $s'_i \equiv s_i - \pi$

**Proposition**

*Lower public provision of safety, $d\pi > 0$, increases the private provision of safety:*

$$\frac{dd^{FB}}{d\pi} > 0.$$ 

*It also increases scale of investment and preventive runs.*

- Consistent with recent evidence (KVJ, 2015)
An intermediary reduces the DD return when demand rises in two cases:

- either under imperfect competition
- or when safety capacity insufficient to achieve the FB

- In this case all investment is liquidated
- Any rise in safety demand requires more inefficient storage
Induced runs (1/2)

- Some investors may have a **liquidity or transaction need**
  - with probability $p > 0$ (independent of investment risk)
  - face cost $\tau > 0$ if they cannot pay at $t = 1$
  - no safety concerns (their return on storage is $s_H$)

- Choose to hold demandable debt claim without safety need if

$$PV < s_B + p\tau$$

- withdraw at $t = 1$ if hit with payment shock (by construction)
Induced runs (2/2)

- **Would these risk-tolerant investors roll over without payment needs?**

- **Two simplifying assumptions**
  - zero mass of investors with liquidity needs
  - perfect competition allocation (first best)

- **Roll over if**
  \[ \gamma R \frac{I^{FB} - S \alpha F(s^{FB})}{b^{FB}} \geq s^{FB} \]

- **Violated if enough mass on low-return investors**
  - Run occur to avoid dilution, not to escape risk

- **Greater private safety provision can induce more runs**
Conclusion

- A theory of intermediation based on fundamental safety need
- Private provision requires demandable debt

- The safety rationale can account for
  - the large and stable scale of safe asset holdings
  - runs in uncertain times without a subset of risk intolerant agents
  - not consistent with traditional transaction or agency rationales

- Implications for cyclical
  - safety premium and volume of intermediation
  - intermediary leverage
  - exposure to risk intolerant runs