Financial Expertise as an Arms Race

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Financial Expertise

Financial expertise facilitates a range of important and productive roles financial intermediaries play in modern economies, including:

- Improving risk-sharing/management
- Overcoming frictions that interfere with efficient trade
- Engineering securities that allow new clienteles to access capital markets

Financial Expertise in Our Paper

We develop a model of OTC trading in which the acquisition of expertise by financial firms becomes an "arms race":

- Investment in financial expertise confers an advantage on any one firm in competing for a fixed surplus
- This advantage is neutralized in equilibrium because of similar investments made by other firms
- Financial expertise can be "dangerous", in that it leads to destruction of surplus in case of exogenous shocks

Financial Expertise in Our Paper

In our model, financial expertise:

- Improves ability to value assets
- Potentially creates adverse selection problems
  - Asymmetric information can disrupt trade (see, e.g., Akerlof, 1970, Samuelson, 1984, or Admati and Perry, 1987)
  - Unavoidable in many settings (e.g., used cars as in Akerlof, 1970, or external financing as in Myers and Majluf, 1984)
  - Avoidable (to some degree) when trading
- Is endogenously acquired

Financial Expertise in Our Paper

How much expertise should a financial firm acquire before trading?

Tradeoff: Bargaining Position vs. Efficient Trade:

- Too little expertise hurts profits when trading with experts
- Too much expertise disrupts trade

Result: Expertise choices are such that tiny jumps in volatility trigger trade breakdowns
$\Rightarrow$ Adverse selection is an equilibrium choice

The Model

- Two ex-ante identical traders/financial firms
- First Stage: Choose level of expertise e_i
  - *Human capital and infrastructure that allow trader i to efficiently value financial assets*
  - Costly
  - Observable
- Second Stage: Trading an asset
  - Two-agent ultimatum bargaining game with (potentially) asymmetric information about value of asset

What is Traded

Asset has common-value component v:

- $v = v_h$ or $v = v_l$ with equal probability

The spread $(v_h - v_l)$ is a measure of volatility or uncertainty

Volatility is stochastic:

- With probability $1 - \pi$, $(v_h - v_l) = \sigma$
- With probability π, $(v_h - v_l) = \theta\sigma$, where $\theta > 1$

Proposer has private incentive, worth 2Δ, to participate in trade

- e.g., on customer's behalf, for liquidity, or for risk sharing

Trading the Asset

Nature moves first:

- Nature designates (potential) buyer and seller as well as volatility state ($v_h - v_l$)
- Nature secretly selects common value of asset $v \in \{v_l, v_h\}$

(Simplified) Bargaining Process:

- Buyer, who may buy one unit of asset:
  - Is always proposer (only for presentation)
  - Is uninformed about common value of asset (only for presentation)
  - Makes take-it-or-leave-it offer p to seller

- Seller, who owns one unit of asset:
  - Receives a signal about common value of asset
  - Accepts or rejects the offer p

Payoffs from Trade

If trade takes place:

- Buyer:
  - $v + 2\Delta - p$
- Seller:
  - $p - v$

If trade breaks down:

- Both get zero from failed trade attempt

Gains to trade: $2\Delta \Rightarrow$ Trading is always efficient

Choosing Expertise

Before entering trading period, any trader i can pay $c(e_i)$ to acquire a level of financial expertise $e_i \in [0, \frac{1}{2}]$

- Probability trader i's signal is correct is $\mu_i = \frac{1}{2} + e_i$
- Expertise level is chosen before trader knows his role as uninformed proposer/buyer or as informed responder/seller
- Expertise level is chosen before trader knows volatility state

Seller's Choices

Let trader i be the seller

After high signal, his valuation:

$$\begin{aligned} E(v \mid s = H) &= \mu_i v_h + (1 - \mu_i) v_l \\ &= \left(\frac{1}{2} + e_i\right) v_h + \left(\frac{1}{2} - e_i\right) v_l \\ &= E(v) + (v_h - v_l) e_i \end{aligned}$$

After low signal, his valuation:

$$E(v \mid s = L) = E(v) - (v_h - v_l) e_i$$

For example, if buyer offers uninformed price $p = E(v)$:

- $E(v \mid s = L) < p < E(v \mid s = H)$
- Seller rejects half the time, destroying half of gains to trade

Buyer's Choices

Low Price

If buyer offers any price below $E(v \mid s = H)$, gains to trade are lost whenever seller's signal is high

Best such price is lowest price seller accepts after low signal:

$$p^* = E(v \mid s = L) = E(v) - (v_h - v_l)e_i$$

Buyer's expected payoff at p^*:

$$\frac{1}{2}[2\Delta + E(v \mid s_i = L) - p^*] = \Delta$$

Seller's expected payoff: 0

Buyer's Choices

High Price

Buyer can avoid losing gains to trade half the time by offering higher price:

$$p^{**} = E(v \mid s = H) = E(v) + (v_h - v_l)e_i$$

Buyer's expected payoff at p^{**}:

$$E(v) + 2\Delta - p^{**} = 2\Delta - (v_h - v_l)e_i$$

Seller's expected payoff:

$$(v_h - v_l)e_i > 0$$

Buyer's Choices

Which Price?

Despite premium paid to seller, buyer prefers higher price p^{**}, which **preserves all gains to trade**, whenever:

$$2\Delta - (v_h - v_l)e_i > \Delta$$

or equivalently:

$$e_i \leq \frac{\Delta}{v_h - v_l}$$

Summarizing Payoffs from Trade

In trading stage, if seller's expertise satisfies $e_i \leq \frac{\Delta}{v_h - v_l}$:

- Buyer offers: $p^{**} = E(v \mid s_i = H)$
- Trade takes place with probability 1
- Buyer's expected payoff: $2\Delta - (v_h - v_l)e_i$
- Seller's expected payoff: $(v_h - v_l)e_i$

If instead $e_i > \frac{\Delta}{v_h - v_l}$:

- Buyer offers: $p^{*} = E(v \mid s_i = L)$
- Trade takes place with probability $\frac{1}{2}$
- Buyer's expected payoff: Δ
- Seller's expected payoff: 0

Ex-Ante Expected Payoffs from Trade

The seller's payoff rises in his own expertise as long as:

$$e_i \leq \bar{e} \equiv \frac{\Delta}{v_h - v_l}$$

If $e_i, e_j \leq \bar{e}$, then ex-ante expected payoff for trader i facing trader j, before knowing role as proposer/buyer or responder/seller:

$$\Delta + \frac{1}{2}(v_h - v_l)(e_i - e_j)$$

A few observations about this situation:

- If $e_i = e_j$, expertise is neutralized
- Marginal benefit of expertise is independent of opponent's
- Cutoff $\bar{e}$ is tighter when $(v_h - v_l)$ is high

Equilibrium in Expertise

Suppose marginal cost of expertise is small enough, i.e.,: $c'\left(\frac{\Delta}{\sigma}\right) < \frac{\sigma}{2}$

- Assuming zero probability of high-volatility state ($\pi = 0$), ALL traders acquiring $\bar{e} = \frac{\Delta}{\sigma}$ of expertise is the unique equilibrium
  - Traders maximize their bargaining payoffs as responders without destroying trade

- Assuming positive probability of high-volatility state ($\pi > 0$), ALL traders acquiring $\bar{e} = \frac{\Delta}{\sigma}$ of expertise remains the unique equilibrium as long such probability is low enough, i.e.: $\pi < \pi^{\theta}$
  - Traders maximize their bargaining payoffs as responders in low-volatility state without destroying trade
  - But such level of expertise, $e_i = \frac{\Delta}{\sigma}$, violates condition for efficient trade in high-volatility state, i.e., $e_i > \frac{\Delta}{\sigma\sigma}$

Arms Race

Equilibrium in expertise has Arms Race structure:

- Any one party gains an advantage by arming himself in the division of a pie
- In equilibrium, each party neutralizes each other's advantage, but had to "waste" resources to get there
- In high-volatility states:
  - Informational advantage becomes more valuable (locally)
  - Adverse selection problems arise
  - Trade breaks down with positive probability, destroying gains to trade

Robustness of Arguments

In the paper, we show that our arguments survive to:

- Seller being proposer rather than responder
- Buyer receiving informative signal (signalling game requiring Grossman-Perry's criterion)
- Expertise generating other revenues unrelated to trading gains (i.e., not a fixed-sum game)

Conclusion

- In our model, financial firms invest in expertise to deter opportunistic bargaining by counterparties
- However, these investments in expertise:
  - become (socially) wasteful in equilibrium
  - create adverse selection
  - magnify the risk of illiquidity and destruction of gains to trade
- Extensions: Interesting dynamics?

Cycles in Financial Expertise and in Trading