Delegated Trade and the Risk Premium

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Slides are posted online at:
http://acct.wharton.upenn.edu/~dtayl/jaeslides.pdf
• Firms produce and provide substantial amounts of *idiosyncratic information*

• Ongoing debate about whether and how a firm’s information environment affects asset prices

• Existing theory suggests that in large economies a firm’s information environment has no effect on the *risk premium* incremental to *factor-betas*
  – In large economies, priced risks only take the form of factor-betas
  – Only *systematic information* useful for assessing the firm’s factor-beta is priced

**Risk premium:** the difference between a firm’s expected cash flow and its expected price

**Factor-beta:** the firm’s covariance with a common risk factor (a macro-economic state variable that takes the same value for all firms in a given period)
• Much of this literature is premised on standard, rational expectations models of trade

• Standard assumption is that individual investors, both informed and uninformed, “self-direct” their trades

• We consider a setting where a fraction of investor in the economy (i.e., $\alpha \in [0,1]$) delegate their trades to a privately informed financial intermediary (e.g., an institutional investor)
  
  – Number of investors in economy  = $N$
  – Number of clients of the intermediary  = $\alpha \ N$
• Large economies generally result in perfect competition (i.e., price-taking behavior)
  – As the number of investors in the economy grows ($N \rightarrow \infty$), any single investor’s effect on price declines: investors become “atomistic”
  – Demand curves become flat: investors with any degree of knowledge about the firm can trade as much as they wish without affecting prices

• The presence of the intermediary in our model prevents a large economy from becoming perfectly competitive
  – As the economy grows, the intermediary's client base (e.g., assets under management) grows in tandem
  – Any potential decline in the intermediary’s effect on price is offset by a corresponding increase from trading on behalf of more clients
The presence of the intermediary results in \textit{imperfect competition} being sustained despite the fact that the economy is large.

Two important implications of imperfect competition:

1. Characteristics of the firm’s information environment affect the risk premium incremental to factor-betas.

2. Priced risk manifests in the form of both idiosyncratic \texttt{firm characteristics} (e.g., a firm’s accounting quality) and \texttt{factor-betas} (e.g., the firm’s exposure to the Fama-French factors).
Structure of Analysis:

Benchmark Model without Delegation  (Section 2)
Exogenous Delegation  (Section 3)
Endogenous Delegation  (Section 4)
Tradeable Common Factor  (Section 5)
Benchmark Model (Section 2)

- Trading takes place in a one-period *perfectly competitive* capital market comprised of $N$ rational, risk-averse investors, each with constant absolute risk tolerance of $\tau$

- The firm’s cash flow has both systematic and idiosyncratic components:

$$\tilde{V}_a = \mu_a + \beta \cdot \tilde{F} + \tilde{\varepsilon}$$

$\tilde{F} \sim N(0, \sigma^2_F)$, $\tilde{\varepsilon} \sim N(0, \sigma^2_\varepsilon)$, $\tilde{F} \perp \tilde{\varepsilon}$, and $\mu_a, \beta$ are fixed parameters

$\beta$ is the firm’s “factor-beta”

$\sigma^2_F$ represents investors’ *assessment* of “systematic cash flow volatility”

$\sigma^2_\varepsilon$ represents investors’ *assessment* of “idiosyncratic cash flow volatility”

1. “Real” volatility of idiosyncratic cash flows; *and*
2. The quality of public information about idiosyncratic cash flows
Benchmark Model (Section 2)

• The firm’s price is \( \tilde{P}_a \), and the firm’s risk premium is given by:

\[
E[\bar{V}_a - \tilde{P}_a] = \frac{1}{N\tau} \left( \beta^2 \sigma_F^2 + \sigma^2_{\epsilon} \right)
\]

Risk premium is expected cash flow less a discount for volatility of cash flow and aggregate risk tolerance of the economy (i.e., \( N\tau \))

• As \( N \) becomes large (\( N \to \infty \)), the firm will be priced at expected cash flow (i.e., risk neutral pricing)
  – The economy’s aggregate risk tolerance gets progressively larger as the economy grows, while total risk stays fixed
  – In the CAPM, the systemic component of cash flow must grow in proportion to the number of investors for “systematic risk” to be meaningful

The only meaningful risk in a large economy is one that grows with the economy
Benchmark Model (Section 2)

• In the context of the above example, similar to the CAPM, let risk associated with the common factor grow in proportion to the number of investors \((\sigma_F^2 = N\sigma_f^2)\); where \(\sigma_f^2\) represents systematic volatility per-capita

• The expression for the risk premium becomes:

\[
E[\bar{V}_a - \bar{P}_a] = \frac{1}{\tau} \beta^2 \sigma_f^2 + \frac{1}{N\tau} \sigma^2
\]

• As \(N\) becomes large \((N \to \infty)\), this reduces to:

\[
E[\bar{V}_a - \bar{P}_a] = \frac{1}{\tau} \beta^2 \sigma_f^2
\]

• Risk premium depends exclusively on the systematic portion of cash flows, and is effectively that of the CAPM

• Benchmark model illustrates that in economies with large \(N\), risk premium is only thought to be a function of factor-betas
Exogenous Delegation (Section 3)

- A fraction of investors in the economy, $\alpha \in [0,1]$ delegate their trading decisions to a single financial intermediary

The intermediary:
- Has private information ($\tilde{y}$) about the idiosyncratic component of the firm’s cash flow, $\tilde{y} = \tilde{e} + \tilde{\xi}$ where $\tilde{\xi} \sim N(0, \sigma^2_{\xi})$
- Does not share his private information with his $\alpha N$ clients but rather trades on their behalf based on his private information
- Trades to maximize each client's expected utility; treats each client identically
- Executes a trade, $\alpha N \cdot D_{la}$ on behalf of his clients, where $D_{la}$ maximizes each client's expected utility conditional on the intermediary's private information, and the aggregate demand order
- Takes into consideration the effect of aggregate demand order, $\alpha ND_{la}$ on price
Exogenous Delegation (Section 3)

• Delegation results in *imperfect competition* despite $N$ being large
  – Imperfect competition implies $Price = \lambda \times Demand$

The risk premium is a function of the product of the extent to which the intermediary’s aggregate demand affects price and the intermediary’s aggregate demand, i.e., $\lambda \cdot \alpha N D_{Ia}$

– $\lambda$ and $\alpha N D_{Ia}$ are endogenous variables that depend on $\sigma^2_f$, $\sigma^2_\varepsilon$, and $\sigma^2_\xi$
– The risk premium is a *product* of risks associated with the systematic and idiosyncratic components (and private information) and grows in relation to $N$

• Under perfect competition, $\lambda = 0$ and thus $\lambda \cdot \alpha N D_{Ia}$ does not affect the risk premium
  – Risks associated with the systematic and idiosyncratic components remain *additive* and *separable* such that the latter vanishes as $N$ gets large
Exogenous Delegation (Section 3)

- As $N$ becomes large ($N \to \infty$), in the presence of delegated trade, the risk premium is given by:

$$E[\tilde{V}_a - \tilde{P}_a] = \Delta(\lambda^*, \cdot) = \frac{\left(\alpha \lambda^* + \tau^{-1} \beta^2 \sigma_j^2\right) \lambda^* - \frac{\alpha \pi_\xi \pi_x}{\pi_\varepsilon (\pi_\varepsilon + \pi_\xi)}}{2\alpha \lambda^* + \tau^{-1} \beta^2 \sigma_j^2}$$

- $\lambda^*$: equilibrium level of illiquidity
- $\pi_\xi$: quality of private information about idiosyncratic component
- $\pi_x$: precision of noise trade
- $\pi_\varepsilon$: quality of public information about idiosyncratic component

- $\pi_\varepsilon$ and $\pi_\xi$ are not additively separable from risk associated with the common factor, they continue to affect the risk premium as $N \to \infty$

- Risk premium is function of traditional features (i.e., $\tau^{-1} \beta^2 \sigma_j^2$) and idiosyncratic characteristics of the information environment (i.e., $\pi_\varepsilon$ and $\pi_\xi$)

Risk premium is decreasing (increasing) in $\pi_\varepsilon$ ($\pi_\xi$)
Endogenous Delegation (Section 4)

• The following aspects of delegation are endogenous:
  1. Number of intermediaries ($M$)
  2. Total fraction of investors who delegate their trades ($\alpha_0 M$)
  3. Fee that intermediaries charge ($\phi$)

• Our approach follows Grossman-Stiglitz (1980)
  – We focus on an economy with no rents
  – We assume intermediaries are homogenous
Endogenous Delegation (Section 4)

• The cost of private information acquisition precludes an individual investor bearing the entirety of the cost

• We assume that investors – rather than pay a fee to acquire information – pay a fee to a financial intermediary

• Intermediary’s role is to acquire private information, trade on behalf of clients, and charge each client a small fee

• Collection of small fees reimburses the intermediary for the large cost of acquiring private information

• Given the presence of institutional investors, this seems descriptive of how information is gathered and disseminated in large economies with atomistic investors
Endogenous Delegation (Section 4)

Three conditions characterize the equilibrium:

1. **Intermediary profit maximization.** Each intermediary earns fee revenue from his clients (per client fee × number of clients); bears a variable cost for each additional client (administrative cost); and pays a fix setup cost (cost of acquiring private information).

2. **Intermediary zero profit condition.** In equilibrium, the number of intermediaries is such that each intermediary earns zero profits; if there were profits (losses), additional intermediaries would enter (leave) invalidating the equilibrium.

3. **Investor indifference condition.** In equilibrium there are no rents to delegation (net of the delegation fee); investors are indifferent between delegating and not; if this were not the case all investors would (not) delegate.
Endogenous Delegation (Section 4)

• Endogenous delegation does not alter the result that characteristics of the information environment affect the risk premium incremental to factor-beta(s)

• Relation among quality of public information, delegation, illiquidity, and risk premium is complex – depends on:

  (i) the quality of private information,
  (ii) systematic cash flow volatility,
  (iii) delegation fee (intermediary’s cost of information acquisition)
  (iv) other features
Analysis

Figure 1C: Public and Private Information

Note that the effect of public information varies with the level of private information
Figure 2C: Public Information and Systematic Cash Flow Volatility

Note that systematic volatility has a much larger (1st order) effect on the risk premium; as systematic volatility approaches zero, effect of public information vanishes.
Note that the delegation fee ($\phi$), is given by the product of the intermediary’s fixed cost of information acquisition ($K$) and per client administrative cost ($k$).
Tradeable common factor (Section 5)

• *Results do not depend on the number of assets in the economy, but whether investors can decompose and separately price risk associated with systematic and idiosyncratic component of cash flows!*

• We demonstrate this by introducing a tradeable common factor:
  – If the traded common factor tracks the true common factor *without noise*, investors can perfectly decompose risks: only risk associated with systematic component is priced
  – If the traded common factor tracks the true common factor *with noise* investors will be unable to perfectly decompose cash flows, and our results attain (see Merton, 1973; Roll, 1977 for examples)

Macroeconomic state variable that determines future investment opportunities, which is not necessarily a traded security

“Roll critique,” the true market portfolio in the CAPM includes private companies and is not tradeable
Implications of Delegated Trade:

• Even in large economies, idiosyncratic characteristics of the information environment can be priced in addition to factor-betas

• Qualities of public and private information about the idiosyncratic component of cash flow have countervailing effects on the risk premium

• Collectively, both systematic and idiosyncratic components of the information environment can be priced in large economies
  – The former manifests in factor-loadings on existing risk factors, the latter manifests in addition to factor-loadings as characteristics of the individual firm’s information environment
  – Information does not appear as a separate “common risk factor”
Thank you!