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Chapter 4.2

Quality of securities issued

Outline

Issuers affecting security quality

- Issuers can affect the value of their securities
- Increasing the value (quality) will be costly to issuers and needs to be balanced against the higher revenue from selling securities
- Better information about the quality by buyers might lead to a stronger reaction of the selling price
- If investment banks are better informed, they might increase the quality of securities sold

Model assumptions

- The security can be of high or low value, V_i, and the issuer knows the type of security it sells
- The buyer only knows the issuer has security H with probability p
- Buyers can obtain the security directly or through an investment bank
- Buyers and investment banks receive a signal $s \in \{H, L\}$
- Signal has precision $Prob\,(s = H|H) = Prob\,(s = L|L) = p_j$
- Investment banks have more precise information than direct buyers $p_B > p_D > \frac{1}{2}$

Bayesian learning

- The probability of the actual quality of the security, given and the observed signal being identical is p_j^s
- $Prob\left(H|s=H\right) = p_j^H = \frac{pp_j}{pp_j+(1-p)(1-p_j)}$
- $Prob\left(L|s=L\right) = p_j^L = \frac{(1-p)p_j}{(1-p)p_j} + p\left(1-p_j\right)$
- We find $p_B^H > p_D^H > p > p_D^L > p_B^L$

Expected value to the buyer

- Buyers will use their signal to assess the value of the security
- If receiving the high signal, the security is worth V_H if the signal is correct and V_L if it is incorrect
- $E_D[V|H] = p_D^H V_H + \left(1 - p_D^H\right) V_L$
- If receiving the low signal, the security is worth V_L if the signal is correct and V_H if it is incorrect
- $E_D[V|L] = p_D^L V_L + \left(1 - p_D^L\right) V_H$

Competitive prices and profits

- The profits of the buyer are $\Pi_C^s = E_D[V|s] - P_s$
- Competition between buyers eliminates all profits: $\Pi_C^s = 0$

$\Rightarrow$ $P_s = E_D[V|s]$

- The signal is high with probability p and low with probability $1-p$
- The costs C ensure the security quality p is achieved
- The seller profits are then $\Pi_S = pP_H + (1-p)P_L - C$

Optimal security quality

- The seller's optimal security quality maximizes his profits, thus we need $\frac{\partial \Pi_S}{\partial p} = 0$

$\Rightarrow \frac{\partial C}{\partial p} = (P_H - P_L) + p\frac{\partial P_H}{\partial p} + (1-p)\frac{\partial P_L}{\partial p}$

- The right hand side is zero for $p = 0$ and $p = 1$ and maximal at $p = \frac{1}{2}$

Competition between direct buyers and investment banks

- The expected value of the security to the investment bank can be determined similarly to that of direct buyers
- $E_B[V|H] = p_B^H V_H + \left(1 - p_B^H\right) V_L$
- $E_B[V|L] = p_B^L V_L + \left(1 - p_B^L\right) V_H$

$\Rightarrow$ $E_B[V|H] > E_D[V|H] > E_D[V|L] > E_B[V|L]$

- As $E_D[V|L] > E_B[V|L]$ the investment bank will not be able to compete with the direct buyer if a low signal L is received
- As $E_B[V|H] > E_D[V|H]$ the investment bank can pay more than a direct buyer if a high signal H is received

Seller profits

- If the value is high, the seller receives $\hat{P}_H = E_B[V|H]$
- If the value is low, the seller receives $\hat{P}_L = E_B[V|L]$ if the signal is correct
- If the signal is not correct, they obtain $\hat{P}_H$
- Issuers face costs to achieve the security quality p
- The expected profits are $\hat{\Pi}_S = p\hat{P}_H + (1-p)\left(p_B\hat{P}_L + (1-p_B)\hat{P}_H\right) - C$

Optimal security quality

- The seller's optimal security quality maximizes his profits, thus we need $\frac{\partial \Pi_S}{\partial p} = 0$

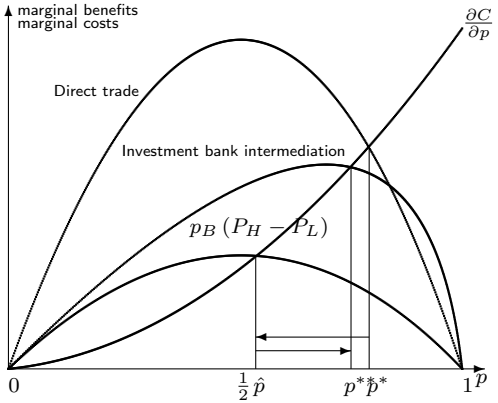
$$\Rightarrow \frac{\partial C}{\partial p} = p_B \left(\hat{P}_H - \hat{P}_L \right) + p \frac{\partial \hat{P}_H}{\partial p} + (1-p) \frac{\partial \hat{P}_L}{\partial p} + (1-p)(1-p_B) \frac{\partial \hat{P}_H}{\partial p}$$

- The first line is similar to the condition for direct trade and has the same properties
- The second line is positive and shifts the maximum of this expression to $p > \frac{1}{2}$

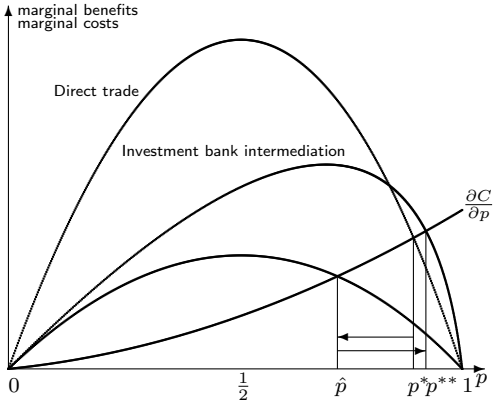
Effect of introducing investment banks

- The first line can be larger or smaller than in direct trade, if investment banks are highly skilled (high p_B) this is likely to be larger
- If it is larger, then as the second line is positive, marginal costs are higher, hence security quality is higher
- If it is smaller, then the change of quality when introducing an investment bank depends on the magnitude of these effects

Reduced security quality with high marginal costs



Increased security quality with low marginal costs



Analysing the effects

- Focus only on the first terms of the first order condition and take the difference: $(P_H - P_L) - p_B \left(\hat{P}_H - \hat{P}_L\right)$
- This can be rewritten as $(1 - p_B)(P_H - P_L) + p_B \left((P_H - P_L) - \left(\hat{P}_H - \hat{P}_L\right)\right)$
- The first term shows the additional revenue to the seller from misidentifying low-quality securities as high quality, this reduces security quality
- The second term shows the differences in value for high-quality and low-quality securities, which widens with investment banks, increasing security quality

Combined effect

- If marginal costs are low, the impact of having larger differences in values between securities in the presence of investment banks dominates and security quality increases
- If marginal costs are high, the impact of misidentifying the quality of securities dominates and security quality decreases

Investment banks do not always increase security quality

- The higher ability of investment banks to identify the quality of securities, gives incentives to issuers to improve the security quality
- The effect is, however, not guaranteed if the ability of the bank is relatively low
- In this case, a secondary effect can dominate, that misidentification of low-quality securities gives incentives to lower the quality of securities

Instances of lower security quality with investment banks

- A lowering of security quality might occur if the issuer is difficult to assess for investment banks (low p_B)
- This might also happen if the buyers are highly skilled (high p_D)
- Small differences in values ($V_H - V_L$), will also reduce incentives to increase security quality

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