Ch 7, ex 3

Payments for order flow.

- One risky security, pays either $v^H = \mu + \sigma$ or $v^L = \mu - \sigma$ with equal probabilities at $t = 1$.
- At $t = 0$ investor gives his broker an order to buy or sell one unit.
  - W.p. ϕ retail investor is retail investor, buys and sells randomly 50/50.
  - W.p. $1 - \phi$ institutional investor, informed w.p. α. If uninformed, buys and sells randomly 50/50.
- Three risk-neutral dealers $1, 2$, and 3 post quotes before the broker contacts them.
  - Broker cannot split his order among dealers
  - Dealers have no private information on the payoff of the security

Ch 7, ex 3, part a

(a) Assume that there is no payment for order flow between the broker and the three dealers. In this case, the broker randomly selects one dealer among those posting the best price for his order. Compute the bid and ask quotes posted by the dealers.

Ch 7, ex 3, part a

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If any single dealer posts quotes at a profit, the other two can undercut and attract order flow $\Rightarrow$ we are down to standard Glosten-Milgrom with competitive dealers.

$$
\begin{aligned}
a &= \mathbb{E}[v|\text{buy}] = \mu + \mathbb{P}(\text{informed}|\text{buy})\sigma \\
&= \mu + \frac{(1-\phi)\alpha/2}{(1-\phi)\alpha/2 + \left[\phi + (1-\phi)(1-\alpha)\right]/2}\sigma \\
&= \mu + (1-\phi)\alpha\sigma \\
b &= \mu - (1-\phi)\alpha\sigma
\end{aligned}
$$

Ch 7, ex 3, part b

(b) Assume now that dealer 1 has a payment for order flow arrangement under which the broker gives dealer 1 all orders from retail investors and the dealer commits to execute all these orders at the best quotes (i.e., the ask and bid price set by the remaining dealers, 2 and 3). Other orders are sent to dealer 2 or 3 as in question a. What are the quotes posted by dealers 2 and 3? Deduce that the bid-ask spread is higher in this case than where there is no payment for the order flow.

Ch 7, ex 3, part b

(b) Assume now that dealer 1 has a payment for order flow arrangement under which the broker gives dealer 1 all orders from retail investors and the dealer commits to execute all these orders at the best quotes (i.e., the ask and bid price set by the remaining dealers, 2 and 3). Other orders are sent to dealer 2 or 3 as in question a. What are the quotes posted by dealers 2 and 3? Deduce that the bid-ask spread is higher in this case than where there is no payment for the order flow.

Dealers 2 and 3 are still competing with each other $\Rightarrow$ post zero-profit quotes

$$
\begin{aligned}
a &= \mu + \mathbb{P}(\text{informed} | \text{buy,institutional})\sigma \\
&= \mu + \frac{(1-\phi)\alpha/2}{(1-\phi)\alpha/2 + (1-\phi)(1-\alpha)/2}\sigma \\
&= \mu + \alpha\sigma > \mu + (1-\phi)\alpha\sigma \\
b &= \mu - \alpha\sigma < \mu - (1-\phi)\alpha\sigma
\end{aligned}
$$

Ch 7, ex 3, part c

(c) Let P be the payment of dealer 1 to the broker. What is the largest possible value of P?

Ch 7, ex 3, part c

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- Dealer 1's per-order profit is:
  - $a - \mu = \alpha\sigma$ from buy orders
  - $\mu - b = \alpha\sigma$ from sell orders
- so dealer 1 would be willing to pay up to $\alpha\sigma$ per order.

Ch 7, ex 3, part d

(d) Is payment for order flow beneficial or detrimental to investors?

Ch 7, ex 3, part d

(d) Is payment for order flow beneficial or detrimental to investors?

- All investors trade at worse prices under order flow payments – bad.
- Dealer 1 and broker profit from order flow payments.
- If many brokers compete with each other, they may transmit part of the profit to (some?) investors.