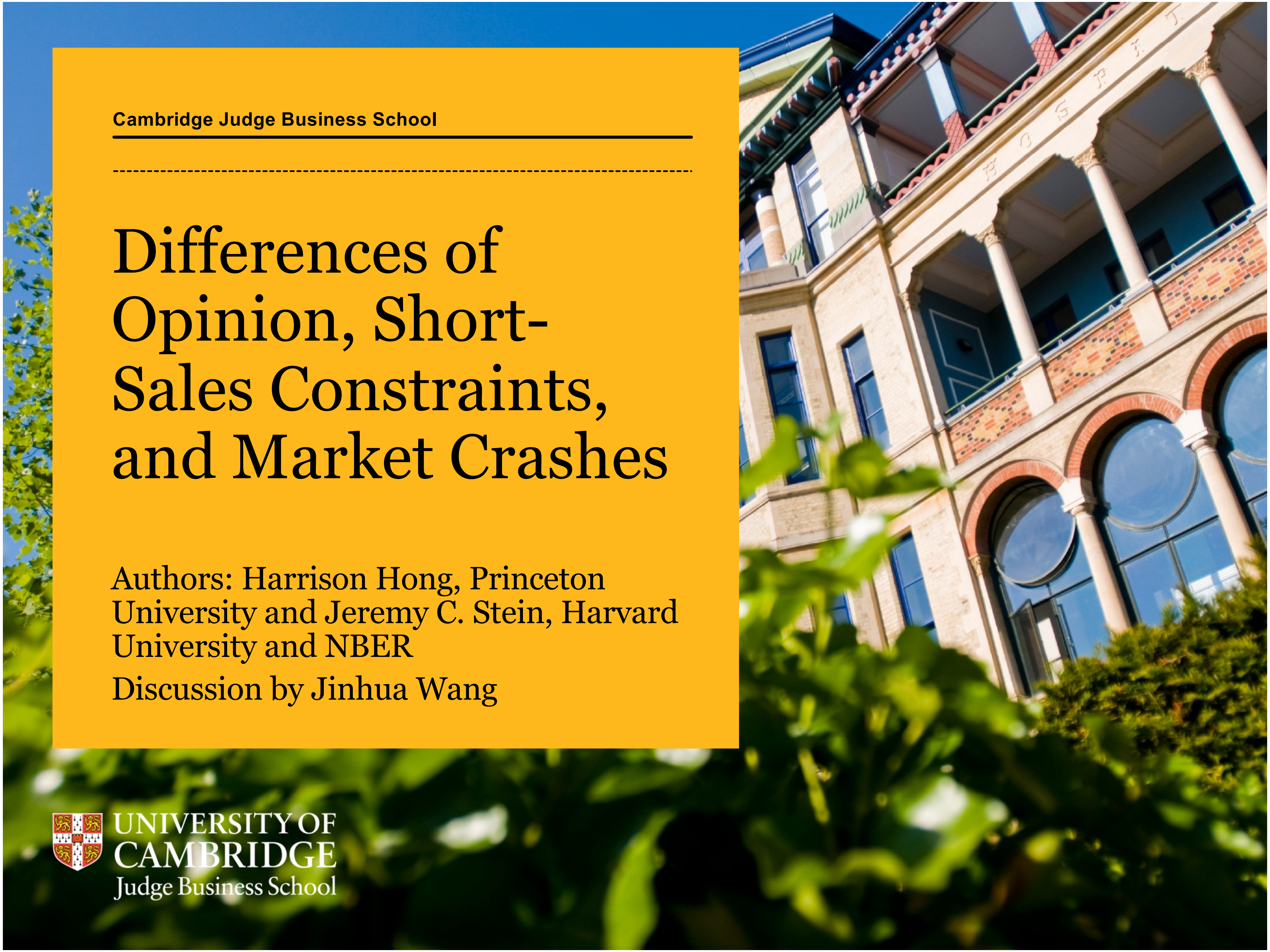

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Differences of Opinion, Short-Sales Constraints, and Market Crashes

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Discussion by Jinhua Wang

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Abstract

Hong and Stein (2003)

- The paper develops a theory based on differences of opinions among investors to explain market crashes.

- A crash is an unusually large movement in stock prices that occurs without a correspondingly large public news event. Moreover, this large price change is negative. A crash is also a “contagious” market wide phenomenon.

- Returns will be more negatively skewed conditional on high trading volume.

Model Assumptions

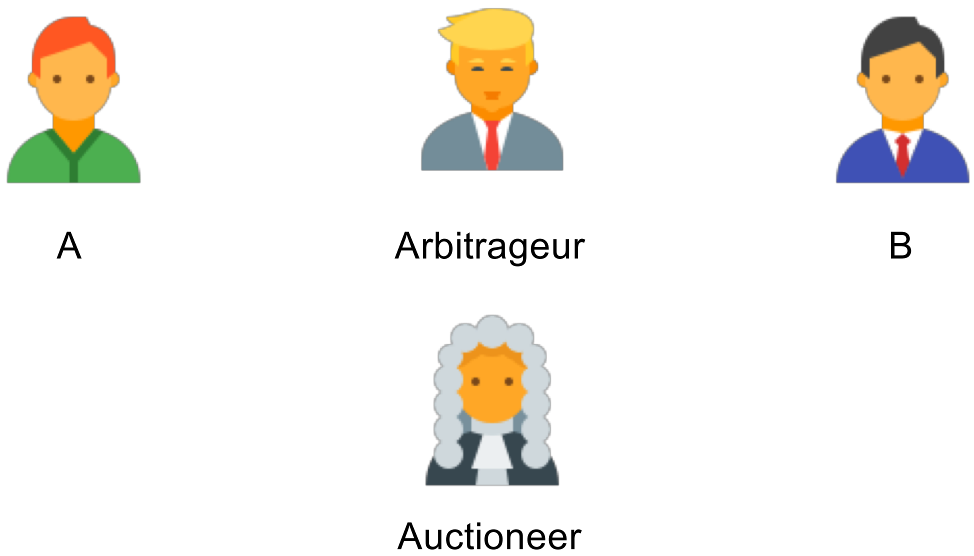
Hong and Stein (2003)

There are two time periods.

Auctioneer announces a trial price p_t , investors A and B call out if their demands are positive. Auctioneers cannot have negative positions (short-sale constraint).

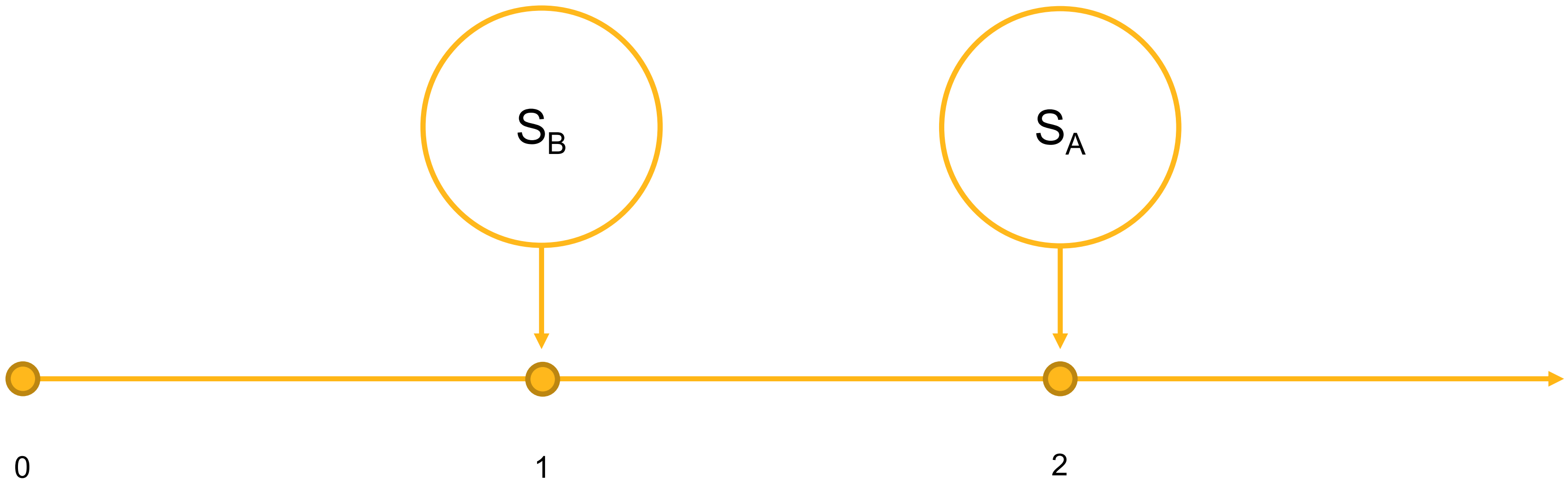
Arbitrageur has no short-sale constraint – he can have negative positions.

Each of A and B will get a private signal on the terminal payoff. However, A only pay attention to his own signal, and vice versa.



The Model

Hong and Stein (2003)



S_A and S_B are the signals A and B receives about terminal payoffs.
S_B is uniformly distributed on $[0, 2V]$
S_A is uniformly and independently distributed on $[H, 2V + H]$
In the view of *rational* Arbitrageur, terminal dividend is given by: $D = \frac{S_A + S_B}{2} + \epsilon$
Demand of A: $Q_A(p_2) = \max[S_A - p_2, 0]$
Demand of B: $Q_B(p_t) = \max[S_B - p_t, 0]$

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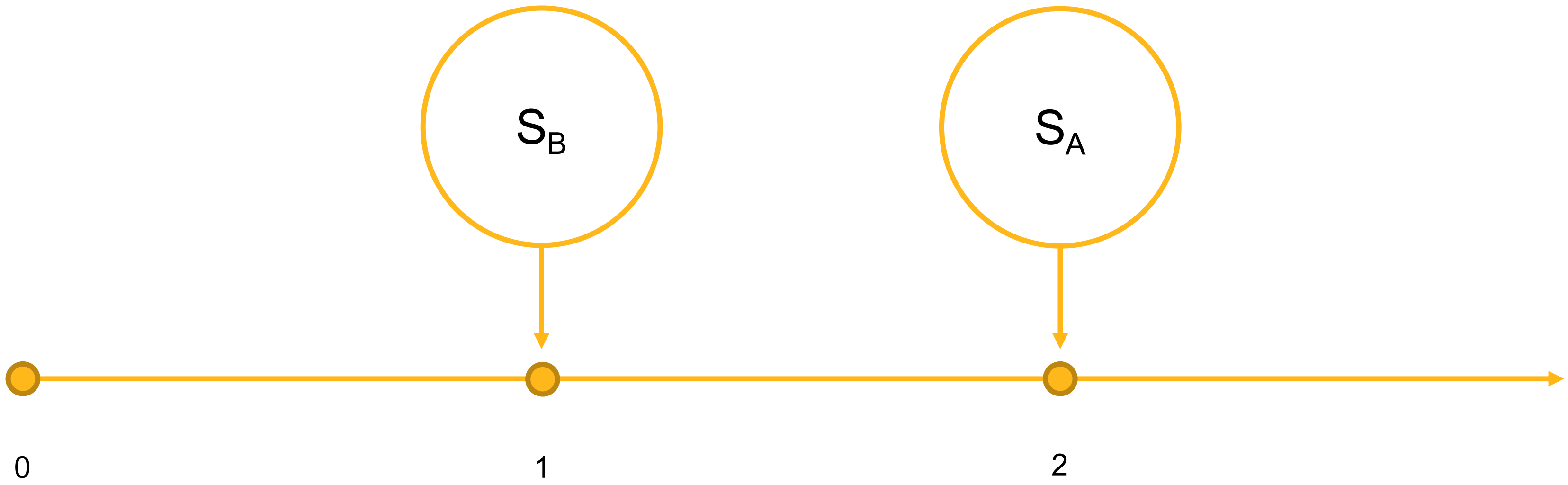
V is the variance of news.
H is a measure of heterogeneity of opinions.
$0 \leq H \leq 2V$

Proposition 1

Hong and Stein (2003)



When investors A and B are fully rational, the short-sales constraint does not bind. Prices fully reflect all information as soon as it becomes available to investors:

$$P_1 = \frac{V + H + S_B}{2}$$

$$P_2 = \frac{S_A + S_B}{2}$$

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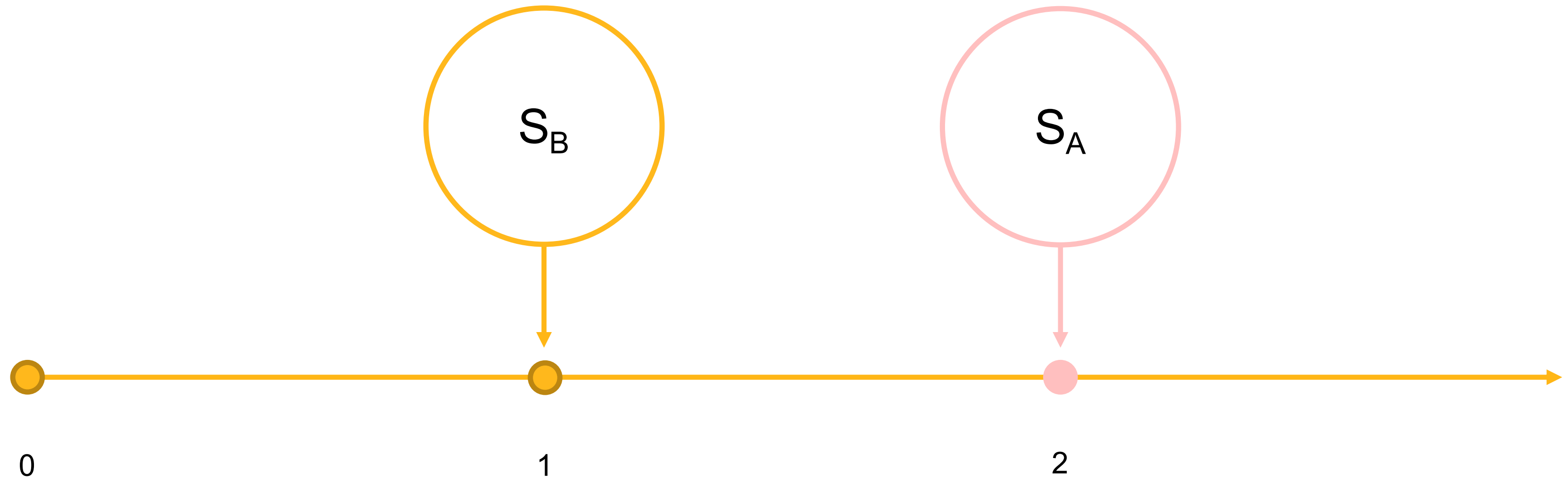
Stage One: Hidden Information

Hong and Stein (2003)



Case 1: Investor B's information is revealed, in which case

$$P_1 = \frac{V + H + S_B}{2}$$

Case 2: Investor B's information remains hidden, in which case

$$P_1 = \frac{V + H}{2} + \frac{E_1(S_B|NR)}{2}$$

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Hidden Information

Hong and Stein (2003)

Because B cannot take short positions, if B doesn't participate in the market, we cannot observe S_B. This happens when S_B is less than the equilibrium price P_1.

There must be a cut-off value S_B^*, above which S_B will be revealed.

$$E_1[S_B|NR] = \frac{\mathrm{S}_\mathrm{B}^*}{2}$$

Therefore, P_1 in case 2 can be written as:

$$P_1 = \frac{V+H}{2} + \frac{\mathrm{S}_\mathrm{B}^*}{4}$$

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Lemma 1 & 2

Hong and Stein (2003)

Setting S_B^* to P_1, we get

$$S_B^* = \frac{V+H}{2} + \frac{S_B^*}{4}$$

$$S_B^* = \frac{2(V+H)}{3}$$

Therefore, for all values $S_B > S_B^*$, there must be revelation of S_B.

For all values of $S_B \leq S_B^*$, the unique equilibrium involves the "pooling" outcome of Case 2, where S_B remains hidden.

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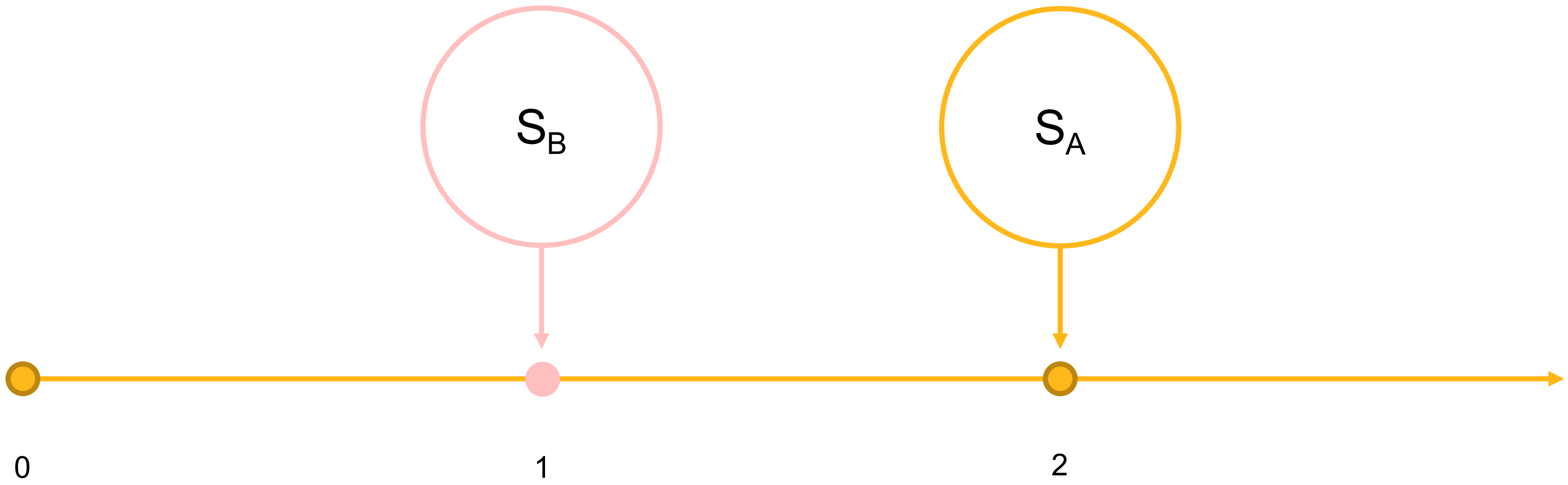
Stage Two: Hidden Information
Hong and Stein (2003)



Case 1:

B's signal was revealed at time 1

Lemma 3 & 4: Let the cutoff value for S_A be

$$S_A^* = \frac{2S_B + H}{3}$$

If $S_A > S_A^*$, S_A is also revealed at time 2. If $S_A > S_A^*$, S_A pools.

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Heart of the Model

Hong and Stein (2003)

Case 2: B's signal was hidden at time 1.

Lemma 5. If $S_A \geq (V+H)$, then S_A is revealed (A starts buying). S_B continues to pool below the old time cut-off of S_B^*.

$$P_2 = \frac{S_A}{2} + \frac{S_B^*}{4} = \frac{S_A}{2} + \frac{V+H}{6}$$

Lemma 6. If $S_A < (V+H)$, then S_A is revealed (A starts selling). Let the new cutoff $S_B^{**} = \frac{2S_A}{3}$. If $S_B \leq S_B^{**}$, then S_A is revealed.

$$P_2 = \frac{S_A}{2} + \frac{S_B^{**}}{4} = \frac{2}{3} S_A$$

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Heart of the Model

Hong and Stein (2003)

Case 2: B's signal was hidden at time 1.

Lemma 7. If $S_A < (V + H)$, and let the cutoff on S_A be $S_A = \frac{2S_B + H}{3}$. If $S \le S_A^*$ and $S_B > H$, then S_A pools below S_A^* and S_B^* is fully revealed.

$$P_2 = \frac{S_B}{2} + \frac{(H + S_A^*)}{4} = \frac{2S_B + H}{3}$$

Lemma 8. In all other cases not covered in Lemma 5 – 7, both S_A and S_B are fully revealed.

$$P_2 = \frac{S_A + S_B}{2}$$

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Heart of the Model

Hong and Stein (2003)

Holding fixed the actual realization of S_B, more information on S_B comes out the lower is S_A.

This shows up in two ways.

1) For a lower S_A, S_B is more likely to be fully revealed.

2) Even if it is not fully revealed, a lower value of S_A implies that S_B will remain hidden in a smaller portion of the lower support of its distribution.

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Skewness

Hong and Stein (2003)

Short-horizon returns will, in an unconditional sense, be negatively skewed as long as there is enough ex ante heterogeneity in investors' opinions - that is, as long as H/V>1.69.

When the heterogeneity parameter H is larger, there will tend to be more turnover. Higher trading volume is associated with more negative skewness.

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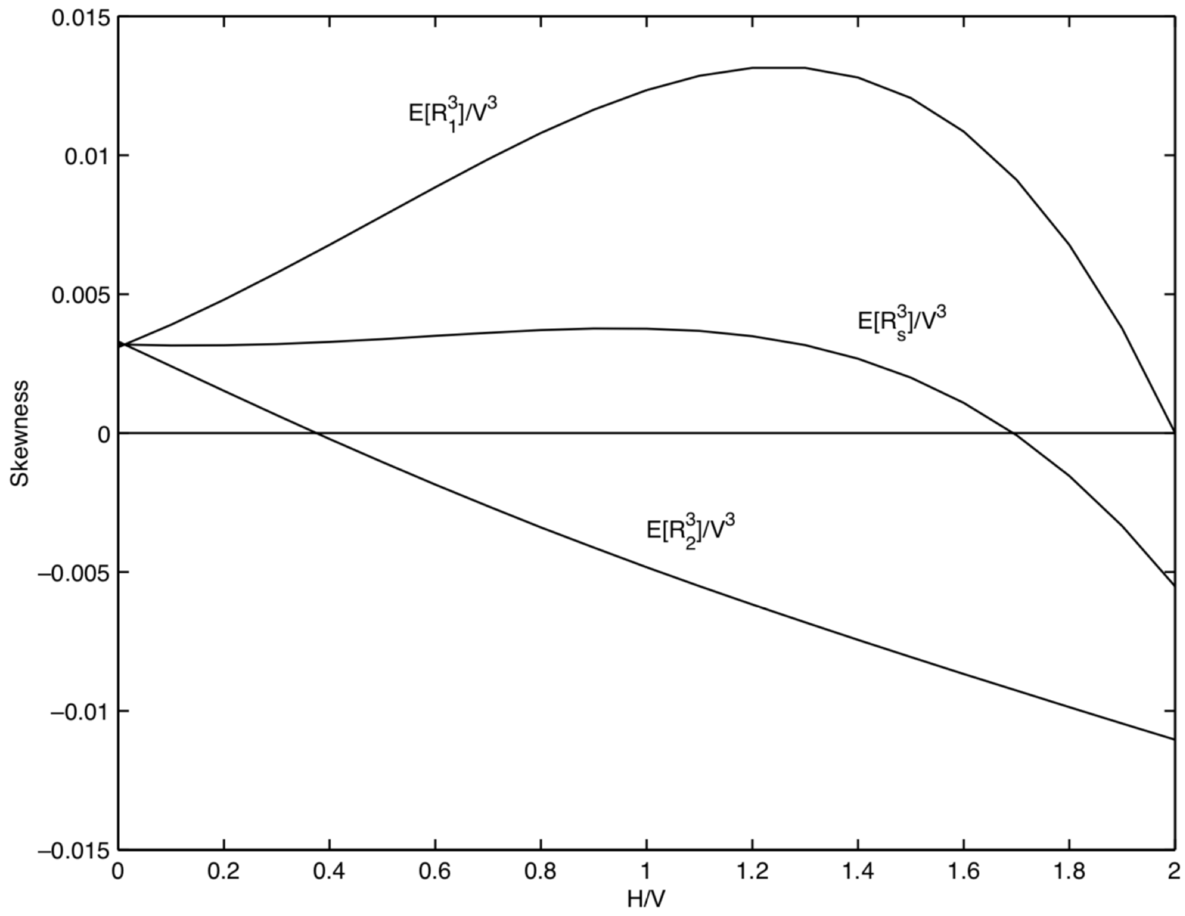

Figure 2
Skewness and differences of opinion
Plot of various skewness measures against a measure of differences of opinion, H/V.

Contagion

Hong and Stein (2003)

Proposition 6: If the return on the market factor is negatively skewed, $E[R_M^3] < 0$, then (i) $cov(\hat{\sigma}_{ij}, R_M) < 0$, and (ii) $cov(\hat{\rho}_{ij}, R_M) < 0$.

If for the market factor, we have that H/V > 1.69, then the market factor will exhibit negative skewness at short horizons, and cross-stock correlations will covary negatively with market returns.

When there is a large drop in the market factor, all stocks tend to fall together.

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