

Group members:

Mateo Martinez
Shpetim Tafili
Wassim Zeddoug
Raphaël Arguello

Final exam

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HEC Lausanne

Market Microstructure

Professor Roxana Mihet

Rules:

1. Work in a group of 2-3 students. You can keep your old group or form a new group.
2. Type up your answers in this PDF file (you can append other files, such as an Excel file or a picture to this PDF file). You can also print this document out and write in the spaces provided and then scan your answers, or you can fill in the PDF document directly.
3. Submit your work by the deadline: Jan 19th, 2025 at 11:59 pm.
4. No late submissions will be accepted.
5. The final exam grade will be curved.

Disclaimer: In submitting this final exam, all the members in your group affirm that this exam represents your own work, without the use of any unpermitted aids or resources. You agree that you understand that there will no tolerance towards academic dishonesty, and that cheating can and will lead to automatic failure from the class as well as a report to the Academic Integrity Committee.

Part I (40 points)

True, false or uncertain? [Explain in less than 8 lines of text (normal font 12 or 14). Only the first 8 lines will be read and graded.]

1. Asymmetric information cannot explain asset trade.

1	False. Asymmetric information plays a crucial role in explaining asset trade. For
2	example, in Kyle's model (1985), informed traders use private information to trade
3	strategically, creating profit opportunities by exploiting less-informed participants.
4	This trading leads to price discovery, as market prices adjust toward the informed
5	trader's valuation. Asymmetric information also explains the bid-ask spread, which
6	compensates liquidity providers for potential losses to informed traders
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2. If markets are efficient, then stock prices reveal all publicly available information.

1	True. In efficient market environment, stock prices immediately incorporate all
2	publicly available information once it is disclosed, including the publicly available
3	information. Fama (1970) highlights that prices efficiently reflect information from
4	earnings reports or other public disclosures, preventing traders from gaining abnormal
5	profits using such data. However, this efficiency depends on market participants'
6	ability to process and act on information quickly. For example, news events like
7	earnings announcements typically result in swift price adjustments.
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3. The higher the number of informed traders, the lower the bid-ask spread.

1	False. A higher proportion of informed traders increases adverse selection risk for
2	market makers. As the dealer always loses to the informed traders, the dealer has to
3	offset potential losses from trading with informed participants by widening the bid-ask
4	spread. Doing this allow him to maintain his profit by benefiting from the liquidity
5	traders (uninformed traders). This relationship is evident in Kyle's model, where
6	greater information asymmetry directly affects liquidity costs. Empirical evidence
7	supports that spreads increase with the prevalence of informed trading.
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4. We measure liquidity in the stock market by the magnitude of how much transaction prices deviate from the mid-point of the bid-ask spread.

1	True. Liquidity is commonly assessed using the effective spread, which measures the deviation of transaction prices from the mid-point of the bid-ask spread. This reflects the cost of immediacy in executing trades. Greater spreads indicate lower liquidity, as seen in studies of high-frequency trading where depth and spread are inversely correlated. Hendershott et al. (2011) find that algorithmic trading improves liquidity by narrowing these spreads. This is further supported by Jones (2002), who links tighter spreads to higher market efficiency.
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5. The relative spread is the ratio between the absolute bid-ask spread and the mid-point

1	True. The relative spread is calculated by dividing the absolute bid-ask spread by the mid-point of the bid and ask prices. This measure normalizes liquidity across securities with varying price levels. It is frequently used to compare liquidity across markets, especially in studies of electronic trading platforms.
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6. In perfectly competitive markets, the profits of a dealer must be strictly positive, otherwise no dealer would be present in the market.

1	Uncertain. In theory, perfect competition leads to zero economic profits due to free entry and exit. However, dealers require positive accounting profits in the short term to cover operational costs and compensate for risks. In the long run, these profits approach zero under perfectly competitive conditions.
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7. The compass rose of the stock market shows that one cannot exploit the market to make a profit.

1	False. The "compass rose" pattern in stock markets arises from the discreteness of price movements, often due to fixed tick sizes. While this pattern introduces a structured appearance in return plots, it does not provide predictive power for future price movements. As noted by Crack and Ledoit (1996), the compass rose represents "structure without predictability," meaning it cannot be exploited for abnormal profits. Additionally, Amilon and Byström (2000) found that while the compass rose can influence statistical estimates, it does not enhance the ability to forecast stock returns.
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8. We can always identify insider trading after the fact by examining the trade-price record immediately prior to an information release.

1	False. Insider trading cannot always be definitively identified by examining trade-price records prior to an information release. While unusual price or volume patterns, such as a spike in trading activity, may suggest insider trading, these patterns alone are not conclusive evidence. For example, in Kyle's model, noise traders create "camouflage" for informed trading, making it challenging to isolate the insider's trades from others
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9. We can think of the "economics of information" much like the "economics of agriculture".

1	True. The "economics of information" and "economics of agriculture" both involve optimizing resource allocation to maximize output. In agriculture, resources like land and labor are managed for crop yields, while in information economics, resources such as time and analytical capacity are allocated to acquire and process valuable information. Grossman and Stiglitz (1980) highlight how individuals strategically decide to acquire information based on its value, akin to efficient agricultural practices. Both fields emphasize balancing costs and benefits to achieve optimal productivity
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10. Stocks held by more investors are more closely followed by all the shareholders.

1	Uncertain. Stocks with a broader investor base often attract more public and
2	institutional analysis, but this does not ensure all shareholders monitor them closely.
3	Dispersed ownership reduces individual incentives to monitor due to collective action
4	problems, as noted by Grossman and Stiglitz (1980). Institutional investors are more
5	likely to monitor actively when holding substantial stakes. Veldkamp (2009) further
6	explains that investors may strategically focus on under-monitored assets, creating
7	disparities in attention despite equal dispersion. Thus, the relationship between the
8	number of investors and monitoring varies by context

Long Question I: COSINE Similarity (60 points)

1. Cosine Similarity Analysis:

- a. Select a sample of 10 firms from a given industry (e.g., tech, pharmaceuticals, or financial services).
- b. Calculate the **cosine similarity** between the business descriptions of firms in the sample for the most recent 10-K filings.

2. Analysis & Interpretation:

- a. Identify pairs of firms that have **high cosine similarity** in their business descriptions.
- b. Identify pairs of firms that have **low cosine similarity** in their business descriptions.

3. Discussion Questions:

- a. **(Market Microstructure Insight 1)**: How might the similarity (or dissimilarity) in business descriptions relate to the nature of competition and product market rivalry in this industry? Relate this to the concepts of **adverse selection** and **informed trading**.
- b. **(Market Microstructure Insight 2)**: If two firms have high cosine similarity in their business descriptions, how might this affect their sensitivity to **common shocks** in the market? How does this relate to **risk sharing** and **information contagion**?
- c. **(Information Frictions Insight)**: Consider the **Grossman-Stiglitz Paradox**. If all firms in an industry had identical business descriptions, would traders have any incentive to acquire costly private information? How does the variation in cosine similarity support (or contradict) this theoretical idea?
- d. **(Empirical Test Idea)**: Propose a way to use the cosine similarity of firms' business descriptions as an independent variable in a regression to predict **trading volume around earnings announcements**. What hypothesis would you test, and how would you interpret the coefficients?

Grading Criteria:

- Correct and clear methodology for computing cosine similarity.
- Depth of analysis in responding to discussion questions, especially linking results to market microstructure theory.
- Creativity and originality in answering the **empirical test idea**.

Submission Format: PDF or Jupyter Notebook.