

MEDIA SENTIMENT, NEWS AND LIQUIDITY OF CHINESE PROPERTY DEVELOPER STOCKS AMIDST THE SHADOW OF A MORTGAGE CRISIS IN CHINA

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- To understand the relationship between the trading process and the information process for the Chinese property development industry during the 2020-2022 liquidity crisis.
- The property sector crisis reached an acute phase in September 2021, when the China Evergrande Group missed offshore bond payments for the first time. Owing to the contagion effect, many Chinese developers subsequently defaulted or claimed that they had significant liquidity issues.
- The Chinese stock market plays an important role in the global economy (**Carpenter and Whitelaw, 2017**). The 2015 stock market crash caused by liquidations of margin accounts created turbulence worldwide. The Chinese property developer sector has been a key driver of the domestic economy since the 1980s.
- The extensions of market microstructure invariance theory (**Kyle and Obizhaeva, 2016**) provide new insights into the changes in the relationship between observable stock market characteristics and different quantitative measures of finance-related information during the significant volume episodes in financial markets. The 2020–2022 Chinese property sector crisis has not been deeply studied from this perspective.

MAIN RESEARCH QUESTIONS

- To what extent do the invariance-implied conjectures explain the relationships between the variables of market activity and different proxies for the arrival rate of economically important information for the sample of Chinese developers during liquidity crisis?
- Does negative (positive) media sentiment induces significant deterioration (insignificant improvement) in stock liquidity?

- **Mitchell and Mulherin (1994)**: market activity is directly related to the number of Dow Jones announcements; however, the observed relationship is not strong. **Kalev et al. (2004)**: the arrival rate of public information, approximated by the number of firm-specific announcements, has a positive and significant impact on the conditional variance of stock returns.
- **Soroka (2006)**: economic agents processed positive and negative economic news differently. **Tetlock (2007)** and **Tetlock et al. (2008)**: news-derived sentiment contains information relevant to predicting U.S. stock returns and earnings.; stock returns tend to respond more strongly to negative news. **Tetlock (2007)** is also the first to develop an approach for quantifying textual information using a bag-of-words language model. **Sheikh et al. (2023)** examine the effect of investor sentiment on herding in the Pakistani and Chinese stock markets and show that herding are greater during pessimistic periods.
- Most previous studies are based on an ad hoc and intuitive approach. In contrast, **Kyle et al. (2017)** suggest a specific quantitative relationship between the number of news items on U.S. firms and trading activity implied by the extension of the market microstructure invariance hypothesis.

MARKET MICROSTRUCTURE INVARIANCE

- **Kyle and Obizhaeva (2016)** make precise predictions about how business time governs the trading process for individual stocks.
- The main quantitative prediction: the rate of information flow μ is proportional to $W^{2/3}$, where W is product of turnover and the percentage standard deviation of daily returns (a measure of trading activity). Using a large database of news articles about U.S. public companies from Thomson Reuters over 2003–2008, **Kyle et al. (2017)** confirm the conjecture that the number of news items μ rises approximately by 2/3 of one percent when trading activity W increases by one percent.
- **Kyle et al. (2017)**: we can imagine a world of trading in which professional investors bet on a flow of information approximated by a flow of news articles about public companies from Thomson Reuters Eikon. Imagine doubling the speed of the time clock. The information flow speeds up: The analysts type twice faster their reports, the journalists publish twice more articles, the news service providers release twice more news items, and twice more news messages appear on the screens of traders. The number of news articles released per day goes up by a factor of 2. The dollar volume goes up by a factor of 2, since investors trade twice as many shares each day. The variance doubles, or equivalently, the standard deviation increases by $2^{1/2}$. The trading activity increases by a factor of $2^{3/2}$.

- Based on the theoretical laws derived in the context of market microstructure invariance, we formulate the novel quantitative prediction about the relationship between trading activity W , the probability of informed trading θ , and the number of news articles mentioning an individual stock μ : $\mu_{jt} \propto W_{jt}^{2/3} \cdot \left(\frac{1-\theta_{jt}}{\theta_{jt}}\right)^{2/3}$. The negative relationship between μ_{jt} and θ_{jt} implied by our conjecture is consistent with the empirical results of Easley et al. (1998), who found that the PIN measure is lower for stocks with broader analyst coverage.
- In the first step, θ_{jt} is estimated as the residuals of the regression of the bid-ask spread s_{jt} on the stock-specific measure of liquidity L_{jt} following the predictions of **Kyle and Obizhaeva (2020)**: $s_{jt} \propto L_{jt}^{-1/3} \cdot \left(\frac{1-\theta_{jt}}{\theta_{jt}}\right)^{-1/3}$.
- In addition to the number of news articles μ , we construct an additional count variable. The bag-of-words approach is applied to obtain panel data on the frequencies of negative word appearance in the news headlines about stock j during week t (λ_{negat}). The ex ante dictionary of positive and negative wordlists created by **Loughran and McDonald (2011)** was used for sentiment classification.

- We also investigate the cross-sectional relationships between the logarithm of the modified invariance-implied liquidity measure L_{jt} and the security-specific measures of negative and positive media sentiment λ_{negat} and λ_{posit} . Although the invariance principle predicts no significant relationship between financial news sentiment and liquidity, we suggest examining this channel.
- Following **Heston and Sinha (2017)**, we include the arrival rate of news articles and news sentiment to distinguish the effect of news sentiment from that of news publication.

- Thomson Reuters Eikon: daily transaction data (OHLC prices and share volume V) for Evergrande stock and other 74 stocks of Chinese developers from the list of comparable companies provided by Thomson Reuters Eikon as of January 2022. We use this data to obtain the estimates for weekly measures of trading activity W_{jt} and liquidity L_{jt} . To estimate
- The data on the relative bid-ask spread s for stocks traded on the Hong Kong Stock Exchange are provided by Cbonds.
- Data on news items were obtained from Thomson Reuters Eikon. To be included in the sample, a news article about each stock from the sample should (1) be written in English; (2) be either from news wire sources, global press sources, or web sources suggested by Refinitiv. Each news item has the following records: timestamp, news source, company ticker, and news headline. To identify new information, we exclude news items with the same time stamp, ticker and news headline.

- To test the main hypothesis about the relation between the trading and information processes, we implement negative binomial (NB) regressions:

$$\mu(W_{it}) = \exp\left(\alpha + \beta_1 \cdot \ln\left(\frac{W_{it}}{W^*}\right) + \beta_2 \cdot \hat{\eta}_{it}\right) \cdot \widetilde{G}_{it}(\alpha), \quad (1)$$

where $\mu(W_{it})$ is the number of news articles of stock i and week t ; α and W^* are constants corresponding to the average number of news articles and the trading activity of some hypothetical “benchmark” stock; $\hat{\eta}_{it}$ is the residuals of the regression of the bid-ask spread s_{jt} on the stock-specific measure of liquidity L_{jt} ; $\widetilde{G}_{it}(\alpha)$ is the Gamma variable with the mean of 1 and the variance of α .

- The extension of the news article invariance hypothesis predicts that $\beta_1 = 2/3$ and $\beta_2 = -2$.
- The zero-inflated negative binomial (ZINB) model allows us to model the number of news items in a slightly different manner: it allows us to correct for overdispersion and excess zeros.

- The findings support the hypothesis that negative (positive) media sentiment induces significant deterioration (insignificant improvement) in stock liquidity during the significant volume episodes in financial markets.
- Our empirical tests reveal that the arrival rate of news articles (negative news sentiment) is not perfectly consistent with the market microstructure invariance: $\hat{\beta}_1 \approx 1/3$.
- Surprisingly, we find that the variable closely related to the probability of informed trading is positively related to the arrival rate of public information during the subperiod from October 2021 to January 2022 ($\hat{\beta}_2 > 0$). **Kyle et al. (2017)**: “news reporters may write articles about the same firms for which traders are starting to acquire private information. Second, private information may arise due to the manner in which public information is processed. For example, asset managers may generate private information after earnings announcements if they have special skills for interpreting available public information.”

LIMITATIONS OF RESEARCH

- The count regression estimates are obtained for the sample of 75 securities that do not completely cover the China's property sector. To check the validity of the empirical results, we would like to expand the coverage and repeat the analysis.
- Chinese equity market is characterized by a large fraction of retail investors who may use social platforms in addition to more professional sources of financial news. To study the relationship between classified sentiment from alternative English and Chinese language texts and measures of liquidity and the trading activity of Chinese property developers' stocks over different periods can be insightful for future research.
- A “bag-of-words” classifier completely ignores the grammatical structure of texts, and it can potentially lead to the misestimation of news sentiment. The next step is to use more sophisticated schemes (e.g. neural networks) to overcome this problem.