Exhibit 20

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA

CASE NO. 21-2989-MDL-ALTONAGA/Damian

In re: JANUARY 2021 SHORT SQUEEZE TRADING LITIGATION

Corrected Expert Report of Professor Steven Grenadier

February 24, 2023

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I. Qualifications

1. I, Steven R. Grenadier, Ph.D., am the William F. Sharpe Professor of Financial Economics at the Graduate School of Business at Stanford University. I have been a member of the Stanford faculty since 1992 and served as the Chair of the Finance Department for over 10 years. My teaching and research focus on the area of investment analysis, including, among other topics, portfolios, performance evaluation, and benchmarking. While at Stanford, I have taught graduate-level courses in Investment Modeling, Portfolio Management, Real Estate Investment, and Finance Theory. In 1987, I graduated Phi Beta Kappa and *summa cum laude* from the University of California at Berkeley with a B.S. in Business Administration. In 1992, I received my Ph.D. in Business Economics (Finance) from Harvard University.

2. I have published numerous articles in finance and economics journals and have spoken at numerous academic and business conferences about my research. I am the co-editor of the *Journal of Real Estate Finance and Economics*, a leading academic real estate journal. My research focuses on sophisticated valuation models of complicated financial structures and their empirical implications. This research includes significant analysis of options. I am a former Trustee of E*Trade Funds, Nicholas Applegate Institutional Funds, and AQR Funds. I have also served as a Senior Consultant to Financial Engines, Inc., an online investment advisor. I currently serve as a Senior Advisor to Cornerstone Research and as a member of the Investment Committee of Vise, an investment management platform.

3. My curriculum vitae, which includes a list of the publications I have authored, is included as **Appendix A**. A list of my deposition and trial testimony over the last four years is included as **Appendix B**.

II. Assignment

4. I have been asked by counsel for Robinhood Markets, Inc., Robinhood Financial LLC, and Robinhood Securities, LLC (together "Robinhood" or "the Company") to assess (i) the market efficiency for the common stock of AMC Entertainment Holdings, Inc. ("AMC"), Bed Bath & Beyond Inc. ("Bed Bath & Beyond" or "BBBY"), BlackBerry Limited ("BlackBerry" or

"BB"), Express, Inc. ("Express" or "EXPR"), GameStop Corp. ("GameStop" or "GME"), Koss Corporation ("Koss" or "KOSS"), Tootsie Roll Industries Inc. ("Tootsie Roll" or "TR"), and American Depositary Shares ("ADRs") of Nokia Corp. ("Nokia" or "NOK") and trivago N.V. ("Trivago" or "TRVG") (collectively, the "At-Issue Stocks") during the period shortly before[1] and during Plaintiffs' proposed class period of January 28, 2021 through February 4, 2021 (the "proposed Class Period"), collectively the "Relevant Period"; (ii) whether Plaintiffs' liability theory in this case is consistent with the existence of efficient markets for the At-Issue Stocks during the Relevant Period; and (iii) whether Plaintiffs can put forward a class-wide damages methodology that is consistent with their theory of liability.

5. I am being compensated at my standard billing rate of $1,250 per hour. I have been assisted in this matter by staff of Cornerstone Research, who worked under my direction. I receive compensation from Cornerstone Research based on its collected staff billings for its support of me in this matter. Neither my compensation in this matter nor my compensation from Cornerstone Research is in any way contingent or based on the content of my opinion or the outcome of this or any other matter.

6. A complete list of the documents that I have considered in forming my opinions is attached as **Appendix C**. My work in this matter is ongoing. The opinions presented in this report are the result of the information available to me as of the report date. I reserve the right to supplement or modify my opinions if new information comes to light and to respond to any additional report(s) or opinions offered by other experts.

III. Summary of Allegations

7. Plaintiffs are bringing a "class action on behalf of persons or entities who held common stock [] or American Depositary Shares [of the nine At-Issue Stocks] as of the close of trading on January 27, 2021, and sold such shares at a loss between January 28, 2021, and February 4,

[1] I considered January 21 through January 27, 2021 as the period shortly before the start of the proposed Class Period. As discussed below, after January 21, 2021, there was evidence of a discernable uptick in mentions of the At-Issue Stocks on social media platforms. See e.g., F. Allen et al. (2023), "Squeezing Shorts Through Social Media Platforms," Working Paper ("Allen et al. (2023)"), Figure 1. Starting this period at a later date that is closer to the proposed Class Period does not change my overall conclusions.

2021."[2] Robinhood implemented certain trading restrictions in the At-Issue Stocks beginning on January 28, 2021 (details on the nature and timing of these restrictions are discussed in **Section V.C** below). Plaintiffs allege that by implementing these restrictions, Robinhood "distorted the prices of the [At-Issue Stocks] for more than a week."[3]

8. I understand that Plaintiffs are bringing claims under Sections 9(a) and 10(b) of the Securities Exchange Act of 1934 ("Exchange Act"). In their Section 10(b) claim, Plaintiffs allege that Robinhood's "actions with respect to all restrictions placed on purchases" of the At-Issue Stocks "constitutes a scheme to defraud."[4] In their Section 9(a) claim, Plaintiffs allege that Robinhood "engaged in … manipulative acts" that "affected and distorted the normal market dynamics" of the At-Issue Stocks through certain actions.[5] I further understand that Section 9(a) claims involve "transactions" in a security, and that the Motion to Dismiss Order limits the Section 9(a) claim to three types of actions involving transactions that Plaintiffs allege Robinhood engaged in, but not to Robinhood's imposition of "position closing only" ("PCO") and position limit restrictions.[6] In other words, my understanding from counsel is that pursuant to the Motion to Dismiss Order, the PCO restrictions and position limits are at issue only for the Section 10(b) claim, whereas other restrictions are at issue for both the Section 9(a) and 10(b) claims.

9. Plaintiffs situate Robinhood's restrictions in the context of what they describe as a "rise in meme stock prices [that] occurred in mid- to late- January 2021." They state that in mid- to late January 2021 "posters on social media investment sites had noted that some hedge funds had taken large short interests" in certain stocks (the so-called "meme stocks").[7] They describe this as leading to an "online battle" between short sellers and retail investors, most prominently for

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[2] Amended Consolidated Class Action Complaint, *In re: January 2021 Short Squeeze Trading Litigation,* United States District Court Southern District of Florida, Case No. 21-2989-MDL-ALTONAGA/Torres, January 17, 2023 ("Complaint"), ¶ 1.
[3] Complaint, ¶ 5.
[4] Complaint, ¶ 144.
[5] Complaint, ¶¶ 137, 139. Specifically, the Complaint alleges that this occurred by Robinhood's "(a) canceling purchase orders for the Affected Stocks placed before the markets opened for trading on January 28, 2021; (b) closing out options positions in AMC and GME early; (c) prohibiting and later restricting purchases of the Affected Stocks on the Robinhood trading platform and (d) abruptly raising margin requirements for Robinhood's customers, forcing those who could not meet the margin calls for the Affected Stocks to sell some or all of their holdings" (Complaint, ¶ 137).
[6] Order, *In re: January 2021 Short Squeeze Trading Litigation*, United States District Court Southern District of Florida, Case No. 21-2989-MDL-ALTONAGA/Torres, August 10, 2022 ("Motion to Dismiss Order"), pp. 16–23.
[7] Complaint, ¶ 40.

the price of GameStop stock, during which "[r]etail investors and savvy hedge funds responded by driving up the price of the stock," and "GameStop's share price began to soar as a result of this public feud,"[8] in what Plaintiffs call "an alleged short squeeze by retail investors."[9]

10. The Complaint notes that the large price movements and high trading volume in the At-Issue Stocks (and in the meme stocks more broadly) caused Robinhood to incur a large (approximately $3 billion) clearinghouse margin requirement. Plaintiffs state that the "initial $3 billion [clearinghouse] deposit requirement forced [Robinhood's] hand"[10] and allege that "[o]nly because of its decision to halt stock purchases," along with a waiver on the National Securities Clearing Corporation ("NSCC") $2.2 billion charge, was Robinhood "able to temporarily solve its 'major liquidity issue.'"[11]

11. Plaintiffs allege that "the share prices of the Affected Stocks plummeted because of Robinhood's unexplained decision to prohibit all share purchases."[12] They further allege that "Robinhood knew the prices of the [nine At-Issue Stocks] would plummet"[13] as a result of the restrictions. Further, they claim that Robinhood "intentionally omitted and/or misrepresented material facts to give the false impression" that the nine At-Issue Stocks were "free of manipulation"[14] by misrepresenting that these restrictions were imposed in response to "significant market volatility,"[15] rather than "to ensure that its upcoming IPO was not derailed by a liquidity crisis" caused by the large margin requirements.[16]

IV. Summary of Opinions

12. The At-Issue Stocks experienced extreme price movements on heavy trading volume leading up to and during the proposed Class Period. These highly unusual price movements and trading volumes were accompanied by analyst and public media scrutiny and evidence of coordinated trading among retail investors. An SEC Report characterized the At-Issue Stocks

[8] Complaint, ¶¶ 41–42.
[9] Complaint, ¶ 8.
[10] Complaint, ¶ 64.
[11] Complaint, ¶ 60.
[12] Complaint, ¶ 69.
[13] Complaint, ¶ 13.
[14] Complaint, ¶ 139.
[15] Complaint, ¶ 63.
[16] Complaint, ¶ 15.

during this period as "meme stocks" where "bullish sentiment[] of individual investors filled social media [causing the prices of these stocks to] skyrocket[]."[17] This period was further described in contemporaneous news reports as a "retail trading frenz[y]"[18] and a "Reddit-fueled craze."[19]

13. In this report, I examine three questions. First, I examine market efficiency of the At-Issue Stocks during the Relevant Period. I conclude that the evidence is inconsistent with the notion that the markets for the At-Issue Stocks were efficient leading up to and throughout the proposed Class Period.[20] A widely accepted definition of an efficient market is one in which "prices always 'fully reflect' available information."[21] In an efficient market prices should rapidly and fully adjust to incorporate new, value-relevant information. A prominent finance textbook explains that a corollary is that one should observe "non-reaction to non-information."[22] That is not what I observe during the Relevant Period. In particular, during this time, the At-Issue Stocks experienced extreme price movements which were not associated with company-specific, value-relevant information that can explain such extreme movements. In other words, value-relevant information about the nine at-issue companies cannot explain the extreme stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the Relevant Period. Consistent with this, more than half of the at-issue companies either stated that they were unaware of changes in their business conditions that would explain these price movements or that they were unaware of any undisclosed information that would account for the price movements. Instead, analysts, academic studies, other observers, and Plaintiffs themselves attribute the price movements to coordinated trading by retail investors, as well as short squeezes or attempted short squeezes, which would be inconsistent with market efficiency. In sum, I conclude that, amid the highly unusual market conditions at this time for these stocks, the evidence is inconsistent with the notion that the markets for the At-Issue Stocks were efficient leading up to and throughout the proposed Class Period.

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[17] "Staff Report on Equity and Options Market Structure Conditions in Early 2021," *U.S. Securities and Exchange Commission*, October 14, 2021 ("SEC Report"), p. 2.
[18] "'Weaponised' options trading turbocharges GameStop's dizzying rally," *Financial Times*, January 27, 2021.
[19] "Discord Bans r/WallStreetBets Over 'Hate Speech,' Reddit Forum Goes Private," *Forbes*, January 27, 2021.
[20] This case involves market efficiency for the nine At-Issue Stocks, not Robinhood's stock.
[21] E.F. Fama (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, 25(2), pp. 383–417 ("Fama (1970)"), at p. 383.
[22] A. Shleifer (2000), *Inefficient Markets: An Introduction to Behavioral Finance*, Oxford, UK: Oxford University Press ("Shleifer (2000)") at p. 5.

14. Second, I examine whether Plaintiffs' liability theory can be consistent with the notion of market efficiency and conclude that it cannot. Plaintiffs' liability theory is based on the notion that Robinhood's restrictions were responsible for the supposedly "artificial" price distortion in the At-Issue Stocks during the proposed Class Period. However, if the markets were efficient, one would not expect trading restrictions that affect a subset of retail investors to have sustained "artificial" price impact. As I will explain in more detail, in an efficient market, if temporary restrictions were placed on stock trading, sophisticated institutional investors and arbitrageurs, who would not be affected by Robinhood's restrictions, would have the incentive to trade to correct any "artificial" price impact due to potential temporary supply/demand imbalances caused by such restrictions, thus preventing the stock price from being "distorted." Accordingly, I conclude that Plaintiffs' liability theory is inconsistent with market efficiency.

15. Third, I understand Plaintiffs need to propose a methodology capable of calculating damages on a class-wide basis. I examine how Plaintiffs could calculate damages in this case on a class-wide basis, and conclude that Plaintiffs face fundamental challenges in providing such a methodology. A calculation of damages would need to calculate what the stock prices would have been in a scenario where Robinhood's restrictions were absent but everything else was held equal (including trading restrictions imposed by certain other brokers), and where markets were not efficient (as discussed above). I am not aware of any formulaic approach or data, let alone traditional methodological tools such as event studies, that would allow Plaintiffs to reliably calculate such hypothetical prices on a class-wide basis in such a setting where markets are not efficient. Even if Plaintiffs were able to show that Robinhood's trading restrictions created "artificial deflation," they would still presumably need to calculate damages based on attempted individualized inferences of whether and how investors would have traded absent the restrictions.

16. A more detailed summary of my opinions in this matter is provided below. The full bases for these opinions are detailed in the sections that follow.

17. **Opinion 1:** The evidence is inconsistent with the notion that the markets for the At-Issue Stocks were efficient leading up to and throughout the proposed Class Period.

18. In an efficient market, the price of a stock should react quickly and fully to new, value-relevant information once it is publicly announced. The basis for the efficient market hypothesis

is that competition among sophisticated investors quickly eliminates opportunities to trade and profit on public information. Such competition causes a stock price to react quickly to new, value-relevant public information about its expected future cash flows and the risks to those cash flows, which are the two key components determining a stock's valuation. Efficient markets arise when there are a sufficiently large number of competing investors—particularly market professionals, such as institutional investors and arbitrageurs (arbitrageurs are investors who seek to profit from temporary "mispricing" in securities, for example, by buying undervalued securities and simultaneously selling overvalued securities, capturing the difference in price)—that can access and trade on the information. Market impediments, such as risks and costs that constrain or prevent arbitrageurs' ability to trade, can result in market inefficiency even for well-followed or actively traded stocks. These deviations from market efficiency due to risks and constraints on arbitrage have been well documented in the academic literature.

19. The stock price movements of the At-Issue Stocks leading up to and during the proposed Class Period were extreme. This is true compared to contemporaneous movements in other stocks, compared to their own historical performance, and when compared historically to a broad set of stocks over the last 25 years. This also holds both when looking at cumulative returns for the At-Issue Stocks during the Relevant Period or at returns on individual days.

- For example, in the week prior to the proposed Class Period, four At-Issue Stocks (Koss, GameStop, Express, and AMC) had the four *largest* cumulative price increases among all 4,232 stocks listed on the New York Stock Exchange ("NYSE") and Nasdaq, and all nine At-Issue Stocks had cumulative returns higher than 98.8% of stocks listed on the NYSE and Nasdaq. During the proposed Class Period, six At-Issue Stocks (GameStop, Koss, Express, AMC, BlackBerry, and Bed Bath & Beyond) had the six *largest* cumulative price declines of all stocks listed on the NYSE and Nasdaq, and all nine At-Issue Stocks had cumulative returns lower than 99.4% of stocks in the group during the proposed Class Period.
- To further analyze the price movements, I compare the price performance of the nine At-Issue Stocks as a group during this period to the returns of one million randomly sampled

portfolios of nine stocks over the last 25 years.[23] This analysis shows that during this period, the At-Issue Stocks as a group were an extreme outlier. The portfolio of At-Issue Stocks was the highest performer the week prior to the proposed Class Period, and the lowest performer during the proposed Class Period, relative to one million randomly sampled portfolios.

- Additionally, the At-Issue Stocks exhibited large and highly unusual stock returns on many individual days during the Relevant Period, with the At-Issue Stocks exhibiting some of their historically largest price increases on January 27, 2021 and largest price declines on January 28, 2021. I employ a widely used methodology, a two-factor regression analysis that controls for movements in market and industry factors, to show that many of the At-Issue Stocks had large, statistically significant residual returns on multiple days leading up to and during the proposed Class Period.

20. These highly unusual price movements were accompanied by very large increases in trading volume and volatility, with each of the At-Issue Stocks experiencing higher trading volume and volatility during this period than they had historically. Indeed, many of the At-Issue Stocks had trading volume (compared to the number of shares outstanding) over a single day as high as a typical stock would experience over an entire year.

21. In an efficient market, an economist would expect that these extreme company-specific price movements would be driven by new information about the companies' financial or business conditions that would cause investors to revise their estimates of the companies' cash flows or the risks to those cash flows. That is not the case here. I analyze the mix of new information in the market about the financial or business conditions of the at-issue companies that might have impacted their stock prices immediately prior to and during the proposed Class Period. For some of the At-Issue Stocks, I find that none of these extraordinarily large price movements were accompanied by such new, potentially value-relevant information. For other At-Issue Stocks, while I have identified certain company-specific information on certain days with large price movements, my analysis shows that the overall extreme stock price run-up and subsequent decline during the Relevant Period cannot be explained by that information.

[23] Because the period considered prior to the proposed Class Period is five trading days, while the proposed Class Period is six trading days, I conduct two different sets of one million random draws covering five and six days, respectively.

22. Consistent with this, six of the nine at-issue companies issued press releases or made statements in their subsequent financial filings discussing the unusual price movements during this period. Several companies stated that they were unaware of changes in their business conditions that would explain these price movements, while others stated that they were unaware of any undisclosed information that would account for the price movements. Analyst reports and public press similarly commented on the large, unusual price movements in the absence of new, value-relevant information, and described the price movements as detached from value-relevant information.

23. Instead, analysts, academic studies, other observers, and Plaintiffs attribute the extreme price movements to other factors, namely coordinated trading through social media, and short-sale constraints and short squeezes or attempted short squeezes, which are inconsistent with or can impede market efficiency.

24. *Coordinated Trading through Social Media*: Analysts, academic studies, other observers, and Plaintiffs attributed the price movements leading up to the proposed Class Period to retail investors coordinating via social media. Academic literature shows that investor coordination can lead to excess stock price volatility and prices failing to quickly and fully incorporate value-relevant information. Analysts, academic studies, other observers, and Plaintiffs comment on the existence of coordinated trading by investors during this period, and the resulting impact on the prices of the At-Issue Stocks. Academic studies and analyst reports have also documented correlation between social media mentions, trading activity, and price movements in meme stocks during this period, including for the nine At-Issue Stocks specifically. This is in line with analyst and public press commentary detailing the impact of retail investors coordinating on social media on the prices of the meme stocks, as well as Plaintiffs' assertions in the Complaint that trading by retail investors drove up prices in GameStop and spread to other At-Issue Stocks. In efficient markets, prices should move in response to new, value-relevant information, not social media attention on stocks, or coordinated trading in the absence of any value-relevant information. The existence of coordinated trading that did not incorporate new, value-relevant information but that impacted prices during the Relevant Period would be inconsistent with market efficiency for the At-Issue Stocks.

25. *Short-Sale Constraints, Short Squeezes, and Attempted Short Squeezes*: Analysts, academic studies, other observers, and Plaintiffs also attributed the price movements of the At-Issue Stocks to short squeezes, attempted short squeezes, or short-sale constraints, which are inconsistent with or can impede market efficiency. Academic research stresses the importance of the ability of market participants to short sell in order for stock prices to quickly and fully incorporate public information. Academic research has shown that short-sale constraints can increase the risks and costs faced by arbitrageurs and thereby impede market efficiency. The constraint on short selling can be manifested as a "short squeeze" where short sellers are forced to close out their positions. When a short squeeze develops, one can usually observe prices increasing sharply in the absence of new, value-relevant information. The sudden increase in prices can have a feedback effect by forcing a large number of short sellers to cover their positions by purchasing the stock, forcing the stock price still higher.

26. Academic studies, analysts, other observers, and Plaintiffs also attributed the price movements during this period to short squeezes or attempted short squeezes. A recent working paper found that there were short squeezes in five of the nine At-Issue Stocks, including GameStop, AMC, Bed Bath & Beyond, Express, and Tootsie Roll, and defined the short squeeze period as covering January 26, 2021 through February 4, 2021.[24] Contemporaneous analyst reports and public press commented on the potential short squeezes in the At-Issue Stocks and noted that high short interest was common among the meme stocks. My own analysis of data from the stock lending market also provides evidence of constraints that may have inhibited the ability of arbitrageurs and other market participants to sell short certain At-Issue Stocks. The existence of short-sale constraints or short squeezes that contributed to the unusual price movements of the At-Issue Stocks during the Relevant Period would be inconsistent with market efficiency.

27. **Opinion 2:** Plaintiffs' liability theory (in particular, the allegation that Robinhood's temporary trading restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period) is inconsistent with market efficiency.

28. Plaintiffs allege that Robinhood's temporary trading restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period. If Plaintiffs'

[24] Allen et al. (2023), Table 1.

allegations were true, and Robinhood's restrictions impacted the prices of the At-Issue Stocks "artificially" throughout the proposed Class Period, that would be inconsistent with market efficiency. In an efficient market, if a portion of retail investors were temporarily affected or excluded as a result of Robinhood's trading restrictions, and (as Plaintiffs allege) this somehow caused a temporary mispricing of the At-Issue Stocks, then other unaffected investors (particularly arbitrageurs) would be expected to quickly enter the market, trade profitably, and thus reverse any temporary mispricing. Plaintiffs' liability theory depends on the premise that somehow other investors, including sophisticated institutional investors (particularly arbitrageurs), were either unwilling or unable to correct "artificial distortion" in the prices of the At-Issue Stocks. That premise for Plaintiffs' liability theory is inconsistent with market efficiency.

29. Thus, the claim that the restrictions had sustained "artificial" price impact and the notion that the markets were efficient are fundamentally at odds. It cannot both be true that (as Plaintiffs allege) Robinhood's temporary trading restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period *and* that the markets for the At-Issue Stocks were efficient throughout the proposed Class Period.

30. Furthermore, I have analyzed Robinhood's share of trading volume for the nine At-Issue Stocks and find that Robinhood customers' *buy* volume and *net buy* (i.e., buy minus sell) volume accounted for an average of 4.5% and 1.0%, respectively, of the total market trading volume across the At-Issue Stocks during the week leading up to the proposed Class Period when these stocks experienced large price increases. During the proposed Class Period, Robinhood's customers' *sell* volume and *net sell* (i.e., sell minus buy) volume accounted for an average of 2.2% and 0.6%, respectively, of the total trading volume across these stocks when their prices generally declined. If the markets for the At-Issue Stocks were efficient, I see no reason why a restriction on a portion of retail investors, which in turn account for a fraction of the overall market, would have "artificially distorted" the stock prices throughout the proposed Class Period.

31. **Opinion 3:** Plaintiffs face fundamental challenges in providing a class-wide damages methodology that is consistent with their theory of liability in this action. While I understand that Plaintiffs do not need to compute damages or assess loss causation at this stage of litigation, I understand they must propose a reliable methodology capable of measuring damages, if any, on

a class-wide basis consistent with their theory of liability. Plaintiffs have not yet put forward their damages methodology. I intend to review Plaintiffs' damages methodology when they propose one. However, in my opinion, Plaintiffs face fundamental challenges in providing a class-wide damages methodology that is consistent with their theory of liability in this particular action for the reasons discussed below.

32. First, Plaintiffs face fundamental challenges in reliably determining the prices for the At-Issue Stocks that would have prevailed if Robinhood had not put trading restrictions in place beginning on January 28, 2021. In this scenario (which I refer to as the "counterfactual" scenario), the prices of the At-Issue Stocks would still have experienced extreme run-ups in the week prior to January 28, 2021. I have also been asked to assume that in the counterfactual scenario, while Robinhood would not impose restrictions, other brokers would still do so. As mentioned above, to the extent that Plaintiffs argue there was "artificial deflation" or "distortion" caused by Robinhood's actions, that would be inconsistent with market efficiency. Accordingly, to measure such alleged "artificial deflation" in an *inefficient* market (i.e., where prices are no longer tethered to new, value-relevant information), Plaintiffs would need to propose a methodology that could identify whether and how market participants (both Robinhood investors and others) would have traded, taking into account that the restrictions imposed by other brokers would have still existed. I am unaware of a formulaic approach or data, let alone traditional methodological tools such as event studies that Plaintiffs may propose,[25] that would allow Plaintiffs to reliably calculate but-for prices (i.e., the prices that would have resulted from the hypothetical supply and demand equilibrium where Robinhood did not impose restrictions) in such a setting.

33. Second, further complicating the challenges discussed above is that any methodology Plaintiffs put forth to measure "but-for" prices and "artificial deflation," and thus damages, must be able to reconcile why the trading restrictions would have affected the prices of the At-Issue Stocks (on which Plaintiffs are suing), but not the prices of other stocks with similar restrictions. Otherwise, Plaintiffs' damages methodology would not be capable of showing damages due to the restrictions, if the restrictions affected some stocks but not others.

[25] As discussed in **Section VIII**, Plaintiffs will not be able to use certain techniques which are commonly proposed as part of damages methodologies, such as event studies, to the extent those techniques require an assumption of market efficiency to draw an inference regarding the stock price impact attributed to the release of certain information.

34. Third, an additional complicating factor to the difficulties discussed above is that Robinhood's trading restrictions changed over the proposed Class Period. Therefore, a reliable damages methodology must be able to account for the changing nature of Robinhood's trading restrictions over the proposed Class Period, separately for each of the At-Issue Stocks.

35. Finally, Plaintiffs face a challenge in providing a class-wide damages methodology for their Section 9(a) claim, separate from their Section 10(b) claim. I understand that the Motion to Dismiss Order limits the Section 9(a) claim to three sets of actions that Plaintiffs allege Robinhood engaged in, namely canceling purchase orders on the morning of January 28, 2021, liquidating certain customers' shares in response to margin calls, and closing out certain options positions—as distinct from the PCO restrictions and position limits that, together with these three sets of restrictions, form a basis for Plaintiffs' Section 10(b) claim. Any methodology that Plaintiffs put forth to measure "artificial deflation," and hence damages, for the Section 9(a) claim must be able to quantify but-for prices absent these other restrictions in a counterfactual scenario where the PCO restrictions and position limits were still in place. Such a methodology—analyzing only a subset of Robinhood's actions, rather than all of them—would add to the challenges Plaintiffs face in order to put forth a damages methodology that can be tethered to their claims. Similar to the above, I am unaware of a formulaic approach or data that would allow Plaintiffs to reliably calculate but-for prices in such a setting where markets are *inefficient*.

V. Background

A. Robinhood and Retail Trading

36. Robinhood Markets, Inc., is a financial technology company that specializes in stocks, options, exchange-traded funds ("ETFs"), and other asset classes.[26] It offers brokerage services through Robinhood Financial LLC, and clearing services through Robinhood Securities, LLC, both of which are registered broker-dealers.[27] The Company was founded in 2013[28] and publicly launched its first product in 2015, a mobile-first retail investing platform requiring no account

[26] See e.g., "Robinhood," *Robinhood,* available at https://robinhood.com/us/en/.
[27] "About Us," *Robinhood*, available at https:/robinhood.com/us/en/about-us/.
[28] Robinhood Markets, Inc., Form S-1, filed July 1, 2021 ("Robinhood July 2021 Form S-1"), p. 8.

minimum for customers.[29] Robinhood offers commission-free trading for stocks, ETFs, options, other securities, and cryptocurrency assets.[30] Robinhood was a privately held company during the proposed Class Period. On July 28, 2021, the Company sold shares in an initial public offering ("IPO") and is listed on Nasdaq.[31]

37. Robinhood is one of a number of major brokerage companies catering to retail investors (i.e., individual traders who buy or sell securities for their personal accounts). Other major retail brokerages include Charles Schwab, E*Trade Financial, Fidelity, Interactive Brokers, and TD Ameritrade.[32] As of March 31, 2021, Robinhood reported $81 billion in assets under custody and an estimated 18 million funded accounts.[33] By contrast, that same year, TD Ameritrade reported over $1 trillion in assets under custody and 11 million client accounts.[34] Charles Schwab reported $6.69 trillion in client assets under custody and 29.6 million brokerage accounts.[35] Therefore, in comparison with other well-established retail brokers, Robinhood had less assets under custody, and its customers held a smaller amount of assets in their accounts, on average.

[29] Robinhood July 2021 Form S-1, pp. 1, 5–7.
[30] Robinhood July 2021 Form S-1, pp. 162, 171.
[31] "Robinhood surges more than 24%, blows past $38 IPO price," *CNBC*, August 3, 2021, available at https://www.cnbc.com/2021/08/03/robinhood-surges-10percent-runs-past-38-ipo-price.html.
[32] In October 2019, Charles Schwab, TD Ameritrade, E*Trade, and Interactive Brokers Group eliminated commission for U.S.-listed stocks, ETFs, and certain other products ("Charles Schwab and TD Ameritrade will eliminate commission for stock and ETF trading. The online broker wars are in full swing," *CNN Business*, October 1, 2019, available at https://www.cnn.com/2019/10/01/investing/charles-schwab-eliminates-commissions/index.html; "E-Trade cuts commissions to zero along with rest of brokerage industry," *CNN Business*, October 3, 2019, available at https://www.cnn.com/2019/10/02/investing/etrade-zero-commissions/index.html; "Online stock trading is free now. What that means for E-Trade and Charles Schwab," *CNN Business*, October 8, 2019, available at https://www.cnn.com/2019/10/07/investing/online-brokers-zero-commissions/index.html).
[33] Robinhood provides a count of "funded accounts," which it defines as follows: "A 'Funded Account' is a Robinhood account into which the account user makes an initial deposit or money transfer, of any amount, during the Relevant Period, which account is designed to provide a customer with access to any and all of the products offered on our platform. Users are considered 'churned' if their accounts were previously Funded Accounts and their account balance (which is measured as the fair value of assets in the user's account less the amount due from the user) drops to or below zero dollars (which negative balances typically result from Fraudulent Deposit Transactions and, less often, from margin loans) for 45 consecutive calendar days" (Robinhood Form S-1, filed August 5, 2021, pp. 25–26).
[34] "Putting our clients first since 1975," *TD Ameritrade*, available at http://web.archive.org/web/20210501184322/https://www.tdameritrade.com/about-us.html. TD Ameritrade did not define a "client account."
[35] "Who We Are," *Charles Schwab*, available at http://web.archive.org/web/20210129013353/https://www.aboutschwab.com/who-we-are. Charles Schwab did not define a "brokerage account."

B. Meme Stocks, Retail Investors Coordinating on Social Media, and Short Squeezes

38. In January 2021, several dozen stocks began experiencing large price movements and/or increased trading volume that far exceeded movements in the broader stock market.[36] An SEC Report analyzing this time period stated that these stocks "skyrocketed to new highs" as "bullish sentiments of individual investors filled social media."[37] These stocks became known as "meme stocks."[38] See **Exhibit 1** for charts with the At-Issue Stocks' price and volume around the Relevant Period.

39. For example, with respect to GameStop (one of the most discussed stocks during this time in press, on social media, and by analysts), an average of 100 million shares traded per day from January 13, 2021 through January 29, 2021, an increase of over 1,400% from its 2020 daily average.[39] The stock price saw an approximately 2,700% increase from its intraday low on January 8, 2021 to its intraday high on January 28, 2021.[40] The SEC Report noted that, along with the increase in price and volume, GameStop saw substantial interest from investors in online investing forums, such as the WallStreetBets subreddit page and various YouTube channels where GameStop was heavily discussed.[41] The SEC Report also noted that At-Issue Stocks Koss, AMC, and Express all saw single-day price increases above 200% on January 27, 2021, which even surpassed any single-day GameStop price movement.[42]

40. Public press described this episode as driven by factors such as "investor euphoria and excessive speculation."[43] In particular, articles from *Forbes* and *Financial Times* noted the role of social media, describing it as a "Reddit-fueled craze"[44] and "retail trading frenz[y]."[45] A *Dow Jones Institutional News* article commented that "newbie investors are gathering on platforms

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[36] SEC Report, p. 16.
[37] SEC Report, p. 2.
[38] SEC Report, p. 2.
[39] SEC Report, pp. 18–19.
[40] SEC Report, p. 19.
[41] "GME experienced a confluence of all of these factors: (1) large price moves, (2) large volume changes, (3) large short interest, (4) frequent Reddit mentions, and (5) significant coverage in the mainstream media. The price and volume movements in GME coincided with substantial interest expressed in certain online forums devoted to investing, including YouTube channels and the subreddit WallStreetBets. Some social media posts heavily touted the prospects for GME" (SEC Report, p. 17).
[42] SEC Report, p. 22.
[43] "Stock Market Falls Hard As S&P 500, Nasdaq Suffer Distribution Days; Apple, Facebook Earnings In Focus," *Investor's Business Daily*, January 27, 2021.
[44] "Discord Bans r/WallStreetBets Over 'Hate Speech,' Reddit Forum Goes Private," *Forbes*, January 27, 2021.
[45] "'Weaponised' options trading turbocharges GameStop's dizzying rally," *Financial Times*, January 27, 2021.

like Reddit, Discord, Facebook and Twitter [and] are encouraging each other to pile into stocks, bragging about their gains and, at times, intentionally banding together to intensify losses among professional traders, who protest that social-media hordes are conspiring to move stock prices," with "GameStop, AMC and BlackBerry [receiving] hundreds of thousands of mentions across social media."[46] A *Reuters* article similarly commented that "[o]nline discussions about stocks on social media platforms such as Reddit, Twitter and Facebook are seen by many traders and analysts as fueling massive share price moves that cannot be explained by fundamental news or traditional valuation metrics … [with investors pointing] to discussion threads such as 'WallStreetBets' on Reddit for driving the surge in GameStop."[47] Another article from the *Wall Street Journal* noted that "[t]he Reddit crowd's gang-pile into these stocks resembles century-old pump-and-dump schemes from the 1920s."[48]

41. While GameStop was cited as an initial focus for retail investors, public press discussion expanded to other "down-on-their-luck companies," such as AMC and Express.[49] Consistent with this, a Credit Suisse analyst report published on February 1, 2021 stated that "day traders have been reportedly aggressively buying the securities of several out-of-favor [] US companies including AAL, AMC, BB, BBY, CTRM, EXPR, GME, KOSS, NAKD, NOK, SNDL, TR, and TRVG" and that "[o]ne trigger for the buying activity was retail investing websites including Reddit's WallStreetBets."[50]

42. Analyst reports and public press noted high short interest[51] as a potential common denominator linking some of the stocks with high social media attention.[52] A Societe Generale analyst report, for example, noted that the "recent wave of Reddit trade ideas" was "recommending buying heavily shorted names" including Nokia, GameStop, AMC, and

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[46] "GameStop Mania Reveals Power Shift on Wall Street—and the Pros Are Reeling," *Dow Jones Institutional News*, January 27, 2021.
[47] "Explainer – How retail traders squeezed Wall Street for bets against GameStop," *Reuters News*, January 27, 2021.
[48] "Stocks Close Sharply Lower on Concerns About Vaccine Rollout; Fed leaves monetary policy unchanged," *Wall Street Journal*, January 27, 2021.
[49] "Melvin assets drop 53% in January after Reddit assault," *Financial Times*, February 1, 2021.
[50] "US Online Brokers," *Credit Suisse*, February 1, 2021.
[51] Short selling is a way to profit from declines in stock prices and involves selling a stock that an investor does not own. Short interest is "a snapshot of the total open short positions existing on the books and records of brokerage firms for all equity securities on a given settlement date" ("What Is Short Interest?," *FINRA*, available at https://www.finra.org/investors/insights/short-interest).
[52] See **Section VI.D.2** below.

BlackBerry.[53] For a number of these stocks, there was discussion of a "short squeeze"[54] or desire to force a "short squeeze,"[55] which was described as an "online battle" between short sellers and retail investors.[56]

43. For example, a Barclays analyst report on January 29, 2021 noted that "[a]lthough the short squeeze started with GME, it appears to be spreading to a wider range of stocks."[57] A *Business Insider* article noted that there was an "epic short-squeeze rally in small companies like GameStop, which surged as much as 145% to an all-time-high on no official news," and that this also "spilled over to other stocks with high short-interest, like BlackBerry, AMC Entertainment, and Bed Bath and Beyond."[58] *Business Insider* also reported that Koss was "the latest heavily-shorted stock to go wild this week as investors on the popular Reddit forum WallStreetBets pile into companies, looking to make a profit from a short-squeeze."[59]

44. For GameStop specifically, two prominent short sellers, Citron Research and Melvin Capital, were the subject of online discussion, and ultimately closed out their short positions at large losses. Following a livestream from Citron Research covering GameStop on January 20, 2021,[60] posts on Reddit's WallStreetBets and comments on Twitter reportedly "identified Citron and Melvin Capital as their primary antagonists early in the rally, hoping to profit by forcing shorts to cover their bets."[61] The episode was also described as a "David and Goliath story []

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[53] "Nokia," *Societe Generale*, February 3, 2021.

[54] Allen et al. (2021) discusses a short squeeze, stating, "If the price of an asset is too low relative to its discounted future cash flows then arbitrageurs will buy it and drive the price up; if the price is too high, they will short sell it and drive the price down. Among the most important limits to this arbitrage process is the possibility of squeezes and corners. In a squeeze, short sellers find it difficult to acquire the securities they need to cover their short position because of a shortage of floating supply and the price rises as a result" (F. Allen et al. (2021), "Market Efficiency and Limits to Arbitrage: Evidence from the Volkswagen Short Squeeze," *Journal of Financial Economics,* 142(1), pp. 166–194 ("Allen et al. (2021)"), p. 167). See also **Section VI.D.2** below.

[55] "Names like GameStop, BlackBerry, and AMC have soared … with little fundamental news behind the moves. The rallies were likely sparked a short squeeze event in the shares, which further fueled the sky-high surges. A short squeeze is when short-sellers are forced to buyback the stock to close out their losing positions, boosting demand for the stock in question" ("From AMC to Bed Bath & Beyond, the market's most-shorted stocks are rallying as Reddit day-traders pile in," *Business Insider*, January 25, 2021).

[56] Complaint, ¶ 41. See also e.g., "Smaller investors face down hedge funds, as GameStop soars," *Associated Press Newswires*, January 26, 2021.

[57] "Bubble Trouble or a Storm in a Teacup?" *Barclays*, January 29, 2021.

[58] "Tech stocks climb in volatile trading as investors await mega-cap earnings," *Business Insider*, January 25, 2021.

[59] "Koss shoots 131% higher as tweet pegs the small-cap headphones maker as a possible next WallStreetBets darling," *Business Insider*, January 26, 2021.

[60] Citron Research Tweet, January 19, 2021, available at https://twitter.com/CitronResearch/status/1351544479547760642.

[61] Testimony of Gabriel Plotkin, Hearing Before the United States House of Representatives Committee on Financial Services, February 18, 2021, p. 2; "GameStop Short-Sellers Melvin Capital and Citron surrender Bearish Bets After 700% Rally Drives Huge Losses," *Business Insider*, January 27, 2021; "GameStop Explodes 105% Higher After Elon Musk's 'Gamestonk' Tweet Extends the Daily Trading Rally," *Business Insider*, January 27, 2021 ("Scores of WallStreetBets users have driven the video-game retailer's stock to record highs, while targeting short-sellers like

playing out on Wall Street … [as a] cavalcade of smaller investors [] has been exhorting each other on the internet to keep the stock's momentum flying toward the moon [with many] pitching it as a battle of regular people versus hedge funds and big Wall Street firms [shorting the stock]."[62] Reportedly faced with steep losses, Melvin Capital closed out its short position in GameStop by the afternoon of January 26, 2021, taking a substantial loss.[63] On January 27, 2021, Citron Research also reported closing out the majority of its short position at a loss.[64] By that time, short sellers were estimated to have accumulated over $5 billion in losses year-to-date on GameStop.[65]

C. Trading Restrictions Imposed by Robinhood and Other Retail Brokerages in Late January and Early February 2021

45. Over the course of multiple days in late January 2021, a number of retail brokerages implemented risk mitigation measures and placed a variety of temporary restrictions on trading activity, including raising margin requirements, implementing PCO restrictions for stocks, and restricting options trading.

46. Several brokers raised margin requirements for certain stocks. Initial margin is an extension of credit from the brokerage firm using a customer's existing positions as collateral; maintenance margin is the amount of equity that must be maintained in a margin account at all

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Gabe Plotkin's Melvin Capital and Maple Lane Capital. The online stock-investing chat group now has over 2.4 million members. Their battle against institutional short-sellers on GameStop has led to an eye-popping 750% rally in 2021 as retail traders grabbed the opportunity to make money off a short squeeze of institutional investors."); "GameStop Surges as Day Traders Squabble With Short Sellers – Market Talk," *Dow Jones Institutional News*, January 22, 2021 ("GameStop shares surge, setting an all-time intraday record after getting a boost from the ongoing battle between day traders and short-sellers. The stock would have its highest close since 2008 at current levels and has more than doubled since last week. A quarrel over GameStop between short-seller Citron Research and day traders on Twitter points to a possible effort by individual investors to squeeze short-sellers. GameStop jumps 36% to $58.78."); "Elizabeth Warren and AOC Slam Wall Streeters Who Criticize the GameStop Rally, Saying They Treat the Stock Market like a 'Casino'," *Business Insider*, January 27, 2021 ("GameStop short-sellers Melvin Capital and Citron surrender bearish bets after 700% rally drives huge losses.").

[62] "Smaller investors face down hedge funds, as GameStop soars," *Associated Press Newswires*, January 26, 2021. The *Wall Street Journal* similarly noted that "[t]he videogame retailer has been at the center of a fight between bullish day traders communicating on the internet forum Reddit, and short sellers, who bet heavily against the stock" ("Nasdaq, S&P 500 Finish at Records; Slew of tech heavyweights including Apple, Microsoft and Tesla are scheduled to post earnings this week," *Wall Street Journal Online*, January 25, 2021).

[63] "Melvin Capital, hedge fund targeted by Reddit board, closes out of GameStop short position," *CNBC*, January 27, 2021, available at https://www.cnbc.com/2021/01/27/hedge-fund-targeted-by-reddit-board-melvin-capital-closed-out-of-gamestop-short-position-tuesday.html).

[64] "Melvin Capital, hedge fund targeted by Reddit board, closes out of GameStop short position," *CNBC*, January 27, 2021, available at https://www.cnbc.com/2021/01/27/hedge-fund-targeted-by-reddit-board-melvin-capital-closed-out-of-gamestop-short-position-tuesday.html.

[65] "Melvin Capital, hedge fund targeted by Reddit board, closes out of GameStop short position," *CNBC*, January 27, 2021, available at https://www.cnbc.com/2021/01/27/hedge-fund-targeted-by-reddit-board-melvin-capital-closed-out-of-gamestop-short-position-tuesday.html.

times, and varies with the market value of the margin securities.[66] Charles Schwab first changed its initial margin requirements on GameStop stock from 70% to 100% on January 13, 2021, and raised margin requirements for eighteen other securities during the week of January 25, 2021.[67] TD Ameritrade also began increasing its margin requirements for GameStop stock on January 13, 2021, and also raised margin requirements on other securities during the week of January 25, 2021.[68] On January 28, 2021, at approximately 9:00AM (before market open), Interactive Brokers announced similar margin requirements for AMC, BlackBerry, Express, GameStop, and Koss, raising margins to 100% on long positions and 300% on short positions.[69, 70]

47. At the same time, several brokers set certain stocks to PCO or "liquidation only" status, effectively limiting purchases in stocks on their trading platforms.

48. For example, beginning at approximately 10:30AM on January 28, 2021, Apex, a clearing brokerage that cleared trades on behalf of dozens of broker-dealers, including Ally Invest, Webull, SoFi, and others,[71] set AMC, GameStop, and Koss stocks and options to liquidation only across all its clients.[72] Apex's restrictions lasted until approximately 2:00PM

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[66] See e.g., "Anger as brokers curb retail investors' bets on GameStop," *Financial Times*, January 28, 2021; "Investor Bulletin: Understanding Margin Accounts," *U.S. Securities and Exchange Commission*, June 10, 2021, available at https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib_marginaccount.

[67] "GameStop and AMC trading restricted by TD Ameritrade, Schwab, Robinhood others," *MarketWatch*, January 28, 2021; "GAME STOPPED: How the Meme Stock Market Event Exposed Troubling Business Practices, Inadequate Risk Management, and the Need for Legislative and Regulatory Reform," *U.S. House Committee on Financial Services*, June 2022 ("HFSC Report"), p. 90.

[68] "GameStop and AMC trading restricted by TD Ameritrade, Schwab, Robinhood others," *MarketWatch*, January 28, 2021. Both TD Ameritrade and Charles Schwab also stopped accepting short sale orders on certain securities and limited certain advanced option strategies that involved leverage (HFSC Report, p. 90).

[69] Interactive Brokers Tweet, January 28, 2021, available at https://twitter.com/IBKR/status/1354792600004386818.

[70] Company statements from Charles Schwab/TD Ameritrade do not specify whether the brokers also increased maintenance margin requirements. Charles Schwab/TD Ameritrade stated that "[b]oth firms, as normal course of business, review and alter margin requirements in highly volatile securities. As margin requirements increase, clients are required to hold more equity in their accounts to make trades in these securities." Interactive Brokers did not specify whether the increased margins applied to initial margin requirements, maintenance margin requirements, or both. Interactive Brokers stated that "IBKR has increased its margin requirements for securities in GME and the other US securities subject to the recent volatility, including up to 100% margin required for long positions and 300% margin on the short side. You can see these margin requirements in your trading platform prior to submitting an order. … IBKR also has the right to modify margin requirements for any open or new positions at any time, in its sole discretion. After all, IBKR is the one whose money is being loaned in a margin trade" ("Schwab Issues Statement About Recent Trading Activity," *Charles Schwab*, January 29, 2021, available at https://pressroom.aboutschwab.com/press-releases/press-release/2021/Schwab-Issues-Statement-About-Recent-Trading-Activity/default.aspx; "FAQs: Securities Subject to Special Requirements," *Interactive Brokers*, available at https://ibkr.info/article/3764).

[71] "Broker Clearing Firms List," *Investor Junkie*, July 20, 2022, available at https://investorjunkie.com/stock-brokers/broker-clearing-firms/; "After growing to nearly $100 billion in custody, Apex Clearing strikes 'IPO' deal to raise 'up to' $1 billion to disrupt existing RIA custody," *RIABiz*, February 22, 2021, available at https://riabiz.com/a/2021/2/23/after-growing-to-near-100-billion-in-custody-apex-clearing-strikes-ipo-deal-to-raise-up-to-1-billion-to-disrupt-existing-ria-custody.

[72] HFSC Report, p. 81.

that same day.[73] E*Trade also halted all purchases of GameStop and AMC stocks on January 28, 2021, removing the restrictions the following day.[74] Trading 212 also placed GameStop and AMC stocks into "reduce-only" on January 28, 2021, re-enabling purchasing before 4:00AM the following day.[75] On January 29, 2021, a British trading app, Freetrade, disabled buy orders on all U.S. stocks that had been placed ahead of market open.[76] Freetrade also restricted U.S. sell orders for a short period of time at market open that same day.[77]

49. Several brokers also placed restrictions on options trading. Starting midday on January 27, 2021, Interactive Brokers allowed "liquidation only" on options trading of AMC, BlackBerry, GameStop, Express, and Koss.[78] Interactive Brokers maintained these restrictions until January 30, 2021.[79] Apex also set options for AMC, GameStop, and Koss to liquidation only for several hours on January 28, 2021, affecting the dozens of broker-dealers for which Apex acts as the clearing broker.[80]

50. Robinhood also raised initial and maintenance margin requirements for certain stocks.[81] Robinhood imposed restrictions on purchasing as well.[82] On January 28, 2021, beginning as early as 8:03AM,[83] like a number of other broker-dealers, Robinhood imposed PCO restrictions

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[73] HFSC Report, Figure 39.

[74] "E-Trade confirms it halted GameStop and AMC stock, will let you buy some Friday," *The Verge*, January 28, 2021, available at https://www.theverge.com/2021/1/28/22254863/etrade-gamestop-amc-stock-reddit-wallstreetbets-robinhood.

[75] Trading 212 Tweet, January 29, 2021, available at https://twitter.com/trading212/status/1355074914202628098?lang=en; "GameStop & AMC Entertainment In Reduce-Only Mode," *Trading 212*, available at https://community.trading212.com/t/gamestop-amc-entertainment-in-reduce-only-mode/41464.

[76] "UK trading app Freetrade halts purchases of US stocks," *CNBC*, January 29, 2021, available at https://www.cnbc.com/2021/01/29/gamestop-saga-uk-trading-app-freetrade-halts-purchases-of-us-stocks.html.

[77] "UK trading app Freetrade halts purchases of US stocks," *CNBC*, January 29, 2021, available at https://www.cnbc.com/2021/01/29/gamestop-saga-uk-trading-app-freetrade-halts-purchases-of-us-stocks.html; "IMPORTANT: Why we had to limit the US market on 29th January (not our choice and we engineered a solution)," *Freetrade*, available at https://community.freetrade.io/t/important-why-we-had-to-limit-the-us-market-on-29th-january-not-our-choice-and-we-engineered-a-solution/34911.

[78] "GameStop and AMC trading restricted by TD Ameritrade, Schwab, Robinhood others," *MarketWatch*, January 28, 2021; Interactive Brokers Tweet, January 28, 2021, available at https://twitter.com/IBKR/status/1354792600004386818.

[79] "Interactive Brokers Lifts All Trading Restrictions on Options," *Interactive Brokers*, January 30, 2021.

[80] HFSC Report, p. 81.

[81] RHMDL00047970.

[82] "Robinhood restricts trading in GameStop, other names involved in frenzy," *CNBC*, January 28, 2021, available at https://www.cnbc.com/2021/01/28/robinhood-interactive-brokers-restrict-trading-in-gamestop-s.htm; "Changes Due to Ongoing Market Volatility," *Robinhood*, January 29, 2021, available at https://web.archive.org/web/20210129195917/https://robinhood.com/us/en/support/articles/changes-due-to-recent-market-volatility.

[83] RHMDL00047970. Robinhood placed equity PCO restrictions on GameStop beginning at 8:03AM, and beginning between 8:07AM and 10:06AM on the other stocks. Robinhood implemented temporary option PCO restrictions beginning around the same time, with restrictions on specific GameStop options beginning at 9:01PM on January 27, 2021.

on certain stocks and options contracts.[84] Robinhood also closed out existing options for some investors in GameStop and AMC, and canceled purchase orders placed before market open in certain stocks.[85] After close of trading on January 28, 2021, Robinhood removed its PCO restrictions on full equity shares and imposed a set of position limits in certain stocks and options.[86] (See **Exhibit 2**.)

51. The limits varied by security. For example, after the close of trading on January 28, 2021, investors were only able to increase their positions up to a maximum of five shares of GameStop stock, 115 shares of AMC stock, and 400 shares of Trivago stock, among other limitations.[87] Investors whose positions exceeded these limits were not allowed to purchase additional shares. Robinhood updated these limits periodically over the course of the following days. On January 29, 2021, at approximately 12:00PM, Robinhood tightened existing equity position limits on many of the stocks, for example, reducing maximum new positions of GameStop stock to two shares and AMC stock to 25 shares while maintaining a limit of 400 shares on Trivago stock.[88] Around 3:00PM that day, Robinhood further tightened equity position limits and imposed limits on additional stocks, reaching a total of 51 different stocks with position limits.[89]

52. Robinhood loosened and/or removed restrictions on the vast majority of the securities between January 30, 2021 and February 2, 2021.[90] For example, equity position limits on Bed Bath & Beyond, Trivago, and Tootsie Roll were removed by January 30, 2021. By mid-morning on February 2, 2021, Robinhood maintained equity position limits on only five stocks: AMC (1,250 shares), Express (3,000 shares), GameStop (100 shares), Naked Brand Group (12,000 shares), and Nokia (2,000 shares).[91] After market close on February 2, 2021, Robinhood

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[84] "Keeping Customers Informed Through Market Volatility," *Robinhood*, January 28, 2021, available at https://web.archive.org/web/20210128140357/https://blog.robinhood.com/news/2021/1/28/keeping-customers-informed-through-market-volatility.

[85] Complaint, ¶ 72.

[86] "Keeping Customers Informed Through Market Volatility," *Robinhood*, January 28, 2021, available at https://web.archive.org/web/20210128140357/https://blog.robinhood.com/news/2021/1/28/keeping-customers-informed-through-market-volatility; "Changes due to ongoing market volatility," *Robinhood*, January 29, 2021, available at https://web.archive.org/web/20210129195917/https://robinhood.com/us/en/support/articles/changes-due-to-recent-market-volatility; RHMDL00047970. Note that the PCO restrictions still applied to fractional shares and options.

[87] RHMDL00047970.

[88] RHMDL00047970.

[89] RHMDL00047970.

[90] RHMDL00047970.

[91] RHMDL00047970.

removed equity position limits on Express, Naked Brand Group, and Nokia. Robinhood removed the two remaining equity position limits, on AMC and GameStop, after market close on February 4, 2021.[92] A high-level chronology of the equity restrictions imposed by Robinhood on the At-Issue Stocks in late January and early February 2021 is shown in **Exhibit 2**.

D. Robinhood's Collateral Requirements

53. The NSCC serves as the central clearing agency for U.S. equities markets and maintains a "Clearing Fund" intended to protect it against losses.[93] Given the financial market "T+2" settlement convention, brokerage firms, such as Robinhood, can be exposed to market risk on the unsettled positions from trades placed by their customers,[94] and therefore are required to post collateral to the clearinghouse to meet the NSCC's Clearing Fund requirements.[95] Each broker-dealer's required deposits depend on a measure of risk—typically linked to the volatility—of securities traded (referred to as "Value-at-Risk" ("VaR") deposits or collateral).[96]

54. During highly volatile periods, the NSCC may require additional margin to cover the increased risk, which can occur if, for example, buyers or sellers do not or cannot carry through their transactions following large, disadvantageous price swings.[97] On January 27, 2021, for example, the NSCC made intraday margin calls to 36 members for a total of $6.9 billion, citing heightened risk from the unprecedented volatility of certain securities.[98] Similarly, Robinhood experienced sharp increases in its NSCC collateral requirements between January 25, 2021 and January 29, 2021.[99] Before the start of trading on January 25, 2021, for example, Robinhood's

[92] RHMDL00047970. Robinhood also removed option contract limits on GME and AMC on February 4, 2021, after market close.
[93] Clearinghouses act as the central counterparty for the majority of equity and options trades in U.S. markets, managing the risk of failure of trades to clear and settle (SEC Report, pp. 14–15).
[94] "For example, if a buyer executes a trade at $100 per share on Monday, but the price falls to $20 on T+2, the buyer might regret the trade and seek to not follow-through with the purchase. …[I]n highly volatile trading where share prices whipsaw by hundreds of dollars, NSCC may require more margin [from clearing brokers like Robinhood] to guard against an increased risk of defaults" (SEC Report, pp. 4, 14, 31).
[95] SEC Report, p. 15.
[96] SEC Report, p. 15. By 10:00AM each trading day, broker-dealers must satisfy their clearinghouse deposit requirements in order to support settlement of their customers' trades (Testimony of Vladimir Tenev, Hearing Before the United States House of Representatives Committee on Financial Services, February 18, 2021 ("Tenev Congressional Testimony"), p. 9).
[97] SEC Report, p. 31.
[98] SEC Report, p. 31.
[99] Tenev Congressional Testimony, pp. 8–10.

collateral requirement from the NSCC totaled approximately $125 million.[100] At 5:11AM on January 28, 2021, following a record-setting day of trading, NSCC informed Robinhood that it had to post a $1.3 billion VaR deposit, and an "excess capital premium charge" of approximately $2.3 billion.[101]

Figure 1: Robinhood NSCC Collateral Requirements

Date/Time	VaR Requirement[2]	Excess Capital Premium[3]	Other Charges[4]	Total Clearing Fund Requirement[5]	Current Deposit[6]	Excess (Deficit)
1/25/21 12:18 AM	$78	-	$47	$125	$136	$11
1/25/21 01:41 PM	$78	-	$125	$202	$128	($74)
1/26/21 03:34 AM	$204	-	$87	$291	$206	($85)
1/27/21 03:19 AM	$245	-	$38	$283	$294	$11
1/28/21 05:11 AM	$1,292	$2,272	$138	$3,702	$696	($3,006)
1/28/21 09:11 AM	$1,292	-	$138	$1,430	$696	($734)
1/29/21 06:26 AM	$144	-	$211	$354	$1,433	$1,079
1/29/21 02:34 PM	$144	-	$316	$460	$1,433	$973

Source: RHMDL00040737; RHMDL00045641; RHMDL00045649; RHMDL00045655; RHMDL00040753; RHMDL00043811; RHMDL00043873; RHMDL00043877; "NSCC Risk Margin Component Guide," DTCC, August 29, 2022, available at https://dtcclearning.com/products-and-services/equities-clearing/nscc-risk-management.html#NSCC-Daily-Margin-Statement; SEC Report, pp. 4, 14–15

Note:

[1] Dollars are reported in millions.

[2] The Volatility ("VaR") component of a clearinghouse member's required deposit is typically the largest component of the deposit and is designed to capture the market price risk associated with the member's portfolio at a 99th percentile level of confidence.

[3] The Excess Capital Premium is charged if a firm's excess capital ratio is greater than 1.0.

[4] Other charges include mark to market, CNS fails, a non-CNS requirement, a margin requirement differential, coverage charges, a margin liquidity adjustment, backtest surcharge, and other special charges.

[5] The Total Clearing Fund Requirement is the total collateral requirement placed at a clearinghouse by the introducing broker for the two days between when a trade is executed but before it settles. The requirement is calculated on a daily basis and includes the VaR requirement, an excess capital premium charge if a firm's excess capital ratio is greater than 1.0, and other charges.

[6] Robinhood's collateral deposit at the NSCC at the time of the margin statement.

55. My understanding is that in response to these requirements, Robinhood imposed the trading restrictions shown in **Exhibit 2**. I understand that of the 11 exchange-traded stocks with the highest VaR charge at Robinhood the morning of January 28, 2021, eight were At-Issue Stocks.[102] Robinhood placed PCO restrictions before market open on January 28, 2021 on these eight At-Issue Stocks, along with Naked Brand Group, Castor Maritime, and Sundial Growers, the other three stocks listed in the top 11 highest VaR charge. Later that morning, Robinhood added PCO restrictions to Tootsie Roll (the final At-Issue Stock) and American Airlines.[103]

[100] **Figure 1**.

[101] **Figure 1**; NSCC can impose excess capital premium charges when members have a degree of margin exposure for cleared positions that exceeds the members' excess net capital (SEC Report, p. 15).

[102] "Volatility Detail Report," January 28, 2021.

[103] "Volatility Detail Report," January 28, 2021. The table indicates that Tootsie Roll had the 63rd highest VaR charge.

56. On the morning of January 28, 2021, the NSCC notified Robinhood that it had reduced the excess capital premium charge of approximately $2.3 billion by more than half, and shortly after 9:00AM, waived the remaining charge.[104] To meet that morning's collateral requirement, Robinhood deposited $737 million with the NSCC.[105]

57. The Company raised an additional $2.4 billion in capital by February 1, 2021.[106] As documented in **Exhibit 2**, by this point, Robinhood had already begun easing restrictions on securities, and eventually lifted all restrictions before trading on February 5, 2021.[107]

VI. Opinion 1: The Evidence Is Inconsistent with the Notion That the Markets for the At-Issue Stocks Were Efficient Leading Up to and throughout the Proposed Class Period

58. In this section, I discuss market efficiency of the nine At-Issue Stocks immediately prior to and during the proposed Class Period. I examine the period immediately prior to the proposed Class Period in addition to the proposed Class Period itself because, as described below, the At-Issue Stocks exhibited highly unusual price patterns and other behavior leading up to the proposed Class Period that subsequently reversed during the proposed Class Period.

59. In **Section VI.A**, I discuss market efficiency from the perspective of financial economics. In **Section VI.B**, I show the dramatic price and volume increases of the nine At-Issue Stocks leading up to the proposed Class Period and subsequent declines during the proposed Class Period. In an efficient market, one would expect a causal relationship between new, value-relevant information and stock returns. Specifically, one would expect large company-specific price fluctuations to be driven by new information about the company's financial or business conditions that could cause investors to revise their estimates of expected cash flows or the risk associated with those cash flows. However, as described below, new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the Relevant Period. In **Section VI.C** and **Section VI.D**, I explain that analysts, academic studies,

[104] **Figure 1**; Tenev Congressional Testimony, p. 9.
[105] Tenev Congressional Testimony, p. 10.
[106] Motion to Dismiss Order, p. 10.
[107] SEC Report, p. 34; "Changes due to ongoing market volatility," *Robinhood*, February 4, 2021, available at http://web.archive.org/web/20210204111409/https://robinhood.com/us/en/support/articles/changes-due-to-recent-market-volatility/; RHMDL00047970.

other observers, and even Plaintiffs attribute these price movements to coordinated trading by retail investors, short-sale constraints, and potential short squeezes.

60. Price movements in response to retail coordination, (attempted) short squeezes, and short-sale constraints, rather than new, value-relevant information, are inconsistent with a finding of market efficiency. Additionally, if, as Plaintiffs allege, prices were "artificially distorted" due to Robinhood's restrictions during the proposed Class Period, this is also inconsistent with market efficiency (as discussed further in **Section VII** below).

61. Below, I also discuss the structural factors courts may use to assess market efficiency (i.e., certain of the *Cammer* and other factors).[108] However, it is important to emphasize that I am examining market efficiency in the highly unusual conditions in the period leading up to and during the proposed Class Period. Even though structural factors, such as high trading volume, were present, conditions in the period leading up to and during the proposed Class Period were highly unusual, and the evidence presented below is inconsistent with the notion that the markets for the At-Issue Stocks were efficient leading up to and throughout the proposed Class Period.

62. Indeed, several prominent economists acknowledged inefficiencies in the market for meme stocks during this period. For example, Professor Eugene Fama—who won the Nobel Prize for his work on market efficiency[109]—commented that "for a couple of days, the market [for GameStop] was very inefficient."[110] Similarly, Professor Burton Malkiel, from Princeton University, referred to this episode as a "speculative craze sparked by social media."[111]

[108] *Rose Cammer, et al. v. Bruce M. Bloom, et al.,* 711 F. Supp. 1264, 1273, United States District Court, New Jersey, April 19, 1989 ("*Cammer*") at pp. 1286–1287; *Elmer Krogman v. R. Dale Sterritt, Jr., et al.,* 202 F.R.D. 467, 478, No. CIV. A. 3:98-CV-2895-M, United States District Court for the Northern District of Texas, Dallas Division, March 29, 2001 ("*Krogman*").

[109] "Eugene Fama's Efficient Market Is a Sound Guiding Principle for Investors and Policymakers," *Forbes*, October 17, 2013, available at https://www.forbes.com/sites/rexsinquefield/2013/10/17/eugene-famas-efficient-market-is-a-sound-guiding-principle-for-investors-and-policymakers.

[110] "Nobel winner Eugene Fama on GameStop, market bubbles and why indexing is king," *MarketWatch*, March 3, 2021, available at https://www.marketwatch.com/story/nobel-winner-eugene-fama-on-bubbles-why-indexing-is-still-king-and-gamestop-11614776294.

[111] "'It's the same phenomenon as the Dutch going crazy in the 1600s buying tulip bulbs. It's happened time and time again. These speculative manias are likely to be a fact of life forever.... In some sense like a game of musical chairs, there's somebody who's going to be left standing.' … 'It is a speculative craze sparked by social media'" ("Here's What Investment Gurus Including Michael Steinhardt And Jeremy Siegel Say About The Meme Stock Bubble," *Forbes*, January 31, 2021).

A. Market Efficiency and Impediments to Arbitrage from the Perspective of Financial Economics

63. In this section, I discuss the general concepts of market efficiency from the perspective of financial economics, as well as potential impediments to market efficiency documented in the academic literature that are salient for contextualizing the highly abnormal price behaviors exhibited by the At-Issue Stocks in the Relevant Period. In an efficient market, prices are expected to quickly incorporate new, value-relevant information about a company's future cash flows or their risks, as a result of competition among investors, including market professionals such as institutional investors and arbitrageurs. However, market impediments, such as risks and costs that constrain or prevent arbitrageurs' ability to trade, can result in market inefficiency even for well-followed or actively traded stocks.

64. Professor Fama's seminal work defines an efficient market as one in which "prices always 'fully reflect' available information."[112] There are different forms of the efficient market hypothesis, reflecting the type of information that is incorporated into prices. I understand that the semi-strong form, which holds that prices in an efficient market always fully reflect all publicly available information, is the relevant form of efficiency when analyzing the issue of reliance in securities litigation.[113] Based on this definition of efficiency, the price of a stock trading in an efficient market should react quickly and fully to new, value-relevant information once it is publicly announced. Academic literature has shown that stock prices react rapidly to new information, in many cases within minutes of the information becoming public.[114] Relatedly, reiteration of previously publicly available information will not have an impact on stock prices in an efficient market.[115] As summarized in a prominent finance textbook examining potential deviations from efficiency in financial markets, "since a security's price must be equal to its value, prices should not move without any news about the value of the security. That is, prices should not react to changes in demand or supply of a security that are not accompanied by

[112] Fama (1970), p. 383.
[113] Fama (1970), p. 383.
[114] J.T. Greene and S.G. Watts (1996), "Price Discovery on the NYSE and the NASDAQ: The Case of Overnight and Daytime News Releases," *Financial Management*, 25(1), pp. 19–42 ("Greene and Watts (1996)") at p. 41–42.
[115] S.A. Ross, R.W. Westerfield, and J. Jaffe (2002), *Corporate Finance*, 6th ed., New York, NY: McGraw-Hill/Irwin ("Ross et al. (2002)") at p. 351 ("According to the efficient-market hypothesis, a stock's abnormal return at time *t*, AR_t, should reflect the release of information at the same time, *t*. Any information released before then, though, should have no effect on abnormal returns in this period, because all of its influence should have been felt before. In other words, an efficient market would already have incorporated previous information into prices.").

news about its fundamental value." The textbook also explains that the efficient market hypothesis predicts "non-reaction to non-information."[116]

65. The basis for the efficient market hypothesis is that competition among sophisticated investors quickly eliminates opportunities to trade and profit on public information. Such competition causes a stock price to react quickly to new, value-relevant public information about the company's expected future cash flows and the risks to those cash flows, which are the two key components determining a stock's valuation.[117]

66. Efficiency is not an inherent or static characteristic of markets. Rather, efficient markets arise when there is a sufficiently large number of competing investors—particularly market professionals, such as institutional investors and arbitrageurs—that can access and trade on the information.[118] Active trading by these competing investors will ensure that any new, value-relevant information concerning a stock can be fully impounded in the price.

67. Arbitrageurs are investors who seek to profit from temporary "mispricing" in securities by, for example, buying undervalued securities and simultaneously selling overvalued securities, capturing the difference in price.[119] Arbitrageurs can have access to large amounts of capital and are incentivized to trade on new, value-relevant information that has not been incorporated into the stock price. By taking advantage of such temporary "mispricing," they stand to make a profit. Therefore, in an efficient market, if at any point a stock price fails to quickly and fully reflect all public information, arbitrageurs can trade to correct the mispricing.[120]

68. I understand that courts have discussed a number of characteristics of an efficient market. For example, *Cammer* specifies five factors for a stock. The first four factors—(i) the average

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[116] Shleifer (2000), p. 5.

[117] For example, Greene and Watts (1996) highlights the nearly immediate response: "Our results indicate that in transaction time, price discovery differs for nontrading- and trading-hours announcements on the NYSE but not on the NASDAQ. In particular, on both exchanges, the majority of the price response to nontrading-hours earnings announcements is realized during the opening trade. However, on the NYSE, the price adjustment to trading-hours earnings announcements is spread evenly over the first several post-announcement trades. On the NASDAQ, the price adjustment to trading-hours earnings announcements is concentrated in the first post-announcement trade with only slight adjustment in the next several transactions" (Greene and Watts (1996), p. 41). See also R.A. Brealey, S.C. Myers, and F. Allen (2011), *Principles of Corporate Finance*, 10th ed., New York, NY: McGraw-Hill/Irwin ("Brealey et al. (2011)") at pp. 78, 321.

[118] For example, Fama (1970) states that a "market may be efficient if 'sufficient numbers' of investors have ready access to available information" (Fama (1970), p. 388).

[119] A. Shleifer and R. Vishny (1997), "The Limits of Arbitrage," *Journal of Finance*, 52(1), pp. 35–55 ("Shleifer and Vishny (1997)") at p. 35.

[120] "In an efficient market, if prices get out of line, then arbitrage forces them back. The arbitrageur buys the underpriced securities (pushing up their prices) and sells the overpriced securities (pushing down their prices). The arbitrageur earns a profit by buying low and selling high and waiting for prices to converge to fundamentals" (Brealey et al. (2011), p. 327).

weekly trading volume of the stock, (ii) the number of securities analysts following and reporting on the stock, (iii) the extent to which market makers and arbitrageurs trade in the stock, and (iv) the issuer's eligibility to file an SEC registration Form S-3—are structural factors meant to indicate whether a sufficiently fluid and informed trading environment exists, which could facilitate the process by which stocks react quickly and fully to new, value-relevant information.[121] The fifth *Cammer* factor—"a cause and effect relationship between unexpected corporate events or financial releases and an immediate response in stock price"—in comparison, constitutes a direct test of market efficiency.[122]

69. Put another way, I understand that *Cammer* Factors 1–4 and other structural factors speak to the question of whether there are a sufficient number of competing investors monitoring and trading the stock. Nonetheless, even for stocks that are actively traded and followed, certain impediments to market efficiency can exist, in particular during periods of unusual trading activity, so that one may not observe the "cause and effect relationship" between new, value-relevant information and price reactions that is direct evidence of market efficiency. This is because, as I will explain below, even for actively traded and well-followed stocks, arbitrageurs' incentives and effectiveness in trading on information can sometimes be affected by capital constraints, trading costs, and various risks they face.

70. Indeed, consistent with *Cammer* Factor 3, academic literature has established that constraints on the ability of arbitrageurs to trade can result in market inefficiency.[123] For example, high stock borrowing costs that restrict arbitrageurs' ability to short sell can prevent them from effectively impounding negative information into stock prices through trading. Such constraints on short selling (as well as uncertainty regarding future short-selling constraints) have been shown in the academic literature to impede market efficiency.[124]

71. Arbitragers also face the risk that when they try to trade against mispricing, the mispricing may worsen. This can happen if arbitrageurs have capital constraints and have to

[121] *Cammer*, pp. 1286–1287. Other structural factors include the *Krogman* factors—(i) the company's market capitalization, (ii) the size of the bid-ask spread, and (iii) the percentage of shares available to the public (i.e., the public float)—and the exchange on which the stock is listed (*Krogman*, p. 6).
[122] *Cammer*, p. 1287.
[123] See e.g., Shleifer and Vishny (1997); M. Mitchell, T. Pulvino, and E. Stafford (2002), "Limited Arbitrage in Equity Markets," *Journal of Finance*, 57(2), pp. 551–584.
[124] See e.g., G. D'Avolio (2002), "The Market for Borrowing Stock," *Journal of Financial Economics,* 66(2), pp. 271–306 ("D'Avolio (2002)") at p. 274.

trade against other investors (e.g., retail traders) who collectively hold different views. The arbitrageurs may have to close out their positions prematurely, before being able to profit from the ultimate "correction" of the mispricing occurring only much later.[125] As I discuss in **Section VI.D.1** below, a short squeeze is one such example. Along a similar vein, recent academic literature has also discussed how stock prices can (temporarily) diverge from their efficient levels due to arbitrageurs being unable to correct mispricing caused by coordinated trading activity by certain investors, or due to predatory trading by other market participants.[126]

72. In summary, in an efficient market where arbitrage functions effectively: (i) the price of a stock would be expected to be affected by new information about future cash flows or about the risks to those cash flows; and (ii) stock prices are expected to move quickly to incorporate new, value-relevant, company-specific information, rather than news that would be irrelevant for the company's future cash flows or their risks.[127] On the other hand, market impediments, such as risks and costs that constrain or prevent arbitrageurs' ability to trade, can result in market inefficiency even for well-followed or actively traded stocks.

B. Large Price Movements Observed for the Nine At-Issue Stocks Leading Up to and throughout the Proposed Class Period Cannot Be Explained by New, Value-Relevant Information

73. I understand that courts consider the fifth *Cammer* factor when assessing market efficiency. The fifth *Cammer* factor considers the existence of a "cause and effect relationship, over time, between unexpected corporate events or financial releases and an immediate response in stock price."[128] This is consistent with the notion of market efficiency in financial economics. In an efficient market, one would expect large company-specific price fluctuations to be driven by new information about the company's financial or business conditions that could cause investors to revise their estimates of expected cash flows or the risk associated with those cash flows. In this section, I show that the nine At-Issue Stocks experienced dramatic price

[125] See e.g., H. Hong and J.C. Stein (2007), "Disagreement and the Stock Market," *Journal of Economic Perspectives*, 21(2), pp. 109–128 ("Hong and Stein (2007)"); J.B. DeLong, et al. (1990), "Noise Trader Risk in Financial Markets," *Journal of Political Economy*, 98(4), pp. 703–738 ("DeLong et al. (1990)").
[126] See e.g., M.K. Brunnermeier and L. H. Pedersen (2005), "Predatory Trading," *Journal of Finance*, 60(4), pp. 1825–1863 ("Brunnermeier and Pedersen (2005)"); F. Allen, L. Litov, and J. Mei (2006), "Large Investors, Price Manipulation, and Limits to Arbitrage: An Anatomy of Market Corners," *Review of Finance*, 10(4), pp. 645–693.
[127] Brealey et al. (2011), p. 321 ("[I]n an efficient market it is not possible to find expected returns greater (or less) than the risk-adjusted opportunity cost of capital. This implies that every security trades at its fundamental value, based on future cash flows … and … the opportunity cost of capital."). See also Ross et al. (2002), p. 351.
[128] *Cammer*, p. 1287.

movements prior to and during the proposed Class Period. However, these extreme price run-ups and subsequent reversals that the At-Issue Stocks collectively experienced over the Relevant Period cannot be explained by new, value-relevant information.

1. Large Price Movements and High Trading Volume

74. As discussed below, there were extreme price increases for each of the At-Issue Stocks leading up to the proposed Class Period that subsequently reversed during the proposed Class Period. I conduct a series of analyses to put the price movements of the At-Issue Stocks into context and show that the price movements were highly unusual. In **Section VI.B.1.a** below, I analyze the cumulative stock price movements of the At-Issue Stocks. The cumulative price movement, or cumulative return, of a stock measures the total return over a multi-day period.[129] I compare these cumulative movements to (i) the contemporaneous price movements of other stocks traded on the NYSE/Nasdaq, (ii) the At-Issue Stocks' own historical price movements, and (iii) the historical performance of a broad set of stocks over the last 25 years. Under all three measures, the price movements leading up to and during the proposed Class Period were highly unusual. In **Section VI.B.1.b** below, I analyze the daily stock price movements of the At-Issue Stocks.[130] I do so in two ways: (i) by comparing raw price movements to the historical price movements of the At-Issue Stocks; and (ii) by utilizing a widely used technique, a two-factor regression model, to control for market and industry effects and test statistical significance. Again, under each method, the At-Issue Stocks have large and unusual returns on many individual days. In **Section VI.B.1.c** below, I analyze the trading volume and price volatility of the At-Issue Stocks, and show that these measures increased dramatically leading up to and during the proposed Class Period.

[129] For example, the five-day cumulative return measures the profit (or loss) on a stock by comparing its value at the end of Day 5 relative to its value at the end of Day 0. For calculating the cumulative return, my analysis assumes any dividends paid by the stock during the period analyzed are re-invested into additional units of the stock on the day that the dividend is paid out.

[130] Specifically, I analyze changes in daily closing prices for the At-Issue Stocks over the period leading up to and during the proposed Class Period.

a) Cumulative Price Movements

75. I analyze the cumulative price movements of the At-Issue Stocks immediately prior to and during the proposed Class Period. I compare these cumulative price movements to other stocks during the same period, against the stocks' own historical performance, and relative to a broad set of stocks over the last 25 years. Each analysis shows that the cumulative price increases prior to the proposed Class Period and the cumulative price declines during the proposed Class Period were unusually large.

76. First, I compare the cumulative price movements of the At-Issue Stocks to those of the other stocks during the same period.[131] As shown in **Figure 2**, all nine At-Issue Stocks had unusually large cumulative price increases in the week leading up to the proposed Class Period. Specifically, four At-Issue Stocks (Koss, GameStop, Express, and AMC) had the four *largest* cumulative price increases among *all 4,232 stocks* listed on the NYSE and Nasdaq.[132] Indeed, all nine At-Issue Stocks had cumulative returns *higher* than 98.8% of all 4,232 stocks listed on the NYSE and Nasdaq the week leading up to the proposed Class Period.

[131] For this analysis, I perform a cross-sectional comparison of the nine At-Issue Stocks and 4,232 other stocks listed on the NYSE and Nasdaq during the same period. First, I identify all common stocks and ADRs listed on the NYSE and Nasdaq. I eliminate any stocks that do not have valid returns for each day between July 14, 2020 and December 31, 2020 (a control period), and between January 21, 2021 and February 4, 2021 (the period of interest). I also eliminate stocks that changed listing exchange during this period.

[132] The stocks with the fifth, sixth, and eighth largest cumulative returns over this period, NAKD, FOSL, and GNUS, were also noted by public press as meme stocks. See e.g., "NAKD Stock: Naked Brand Shares Rocket Fueling $1 Compliance Dreams," *Investor Place*, January 27, 2021, available at https://www.nasdaq.com/articles/nakd-stock%3A-naked-brand-shares-rocket-fueling-%241-compliance-dreams-2021-01-27; "2 Reasons Why Genius Brands' Stock Crash Could Be Just Getting Started," *Motley Fool*, February 5, 2021, available at https://www.fool.com/investing/2021/02/05/reasons-genius-brands-stock-crash-could-begin/; "Why Fossil, Bed Bath & Beyond, and Macy's Stocks Surged Today," *Motley Fool*, January 27, 2021, available at https://www.fool.com/investing/2021/01/27/why-fossil-bed-bath-beyond-and-macys-stocks-surged/.

Figure 2: Cumulative Returns of At-Issue Stocks Relative to Contemporaneous Performance of NYSE/Nasdaq Stocks, 1/21/21 – 1/27/21

At-Issue Stock	Percentile Rank	Rank (Out of 4,232)	Cumulative Return (1/21 – 1/27)
Koss Corporation	100.0%	1st Largest	1,591%
GameStop Corp.	100.0%	2nd Largest	788%
Express, Inc.	100.0%	3rd Largest	723%
AMC Entertainment Holdings, Inc.	99.9%	4th Largest	570%
Bed Bath & Beyond, Inc.	99.8%	10th Largest	112%
BlackBerry Limited	99.7%	13th Largest	96%
Nokia Corporation	99.3%	32nd Largest	56%
trivago N.V.	99.1%	39th Largest	51%
Tootsie Roll Industries, Inc.	98.8%	52nd Largest	44%

Source: *CRSP*
Note: This analysis examines the 4,232 common stocks and ADRs listed on the NYSE and Nasdaq that have valid returns between 7/14/20 and 12/31/20 and between 1/21/21 and 2/4/21, inclusive of the At-Issue Stocks. A stock has a valid return in the data if the return for the period is not missing and is not marked with one of the error codes assigned by *CRSP*.

77. Additionally, during the proposed Class Period, all nine At-Issue Stocks experienced unusually large cumulative stock price declines. As shown in **Figure 3**, six At-Issue Stocks (GameStop, Koss, Express, AMC, BlackBerry, and Bed Bath & Beyond) had the six *largest* cumulative price declines of *all 4,232 stocks* listed on the NYSE and Nasdaq. Indeed, all nine At-Issue Stocks had cumulative returns *lower* than 99.4% of all stocks in the group during the proposed Class Period.

Figure 3: Cumulative Returns of At-Issue Stocks Relative to Contemporaneous Performance of NYSE/Nasdaq Stocks, 1/28/21 – 2/4/21

At-Issue Stock	Percentile Rank	Rank (Out of 4,232)	Cumulative Return (1/28 – 2/4)
GameStop Corp.	0.0%	1st Lowest	-85%
Koss Corporation	0.0%	2nd Lowest	-68%
Express, Inc.	0.1%	3rd Lowest	-66%
AMC Entertainment Holdings, Inc.	0.1%	4th Lowest	-64%
BlackBerry Limited	0.1%	5th Lowest	-52%
Bed Bath & Beyond, Inc.	0.1%	6th Lowest	-49%
Nokia Corporation	0.4%	16th Lowest	-33%
Tootsie Roll Industries, Inc.	0.5%	23rd Lowest	-27%
trivago N.V.	0.6%	25th Lowest	-25%

Source: *CRSP*
Note: This analysis examines the 4,232 common stocks and ADRs listed on the NYSE and Nasdaq that have valid returns between 7/14/20 and 12/31/20 and between 1/21/21 and 2/4/21, inclusive of the At-Issue Stocks. A stock has a valid return in the data if the return for the period is not missing and is not marked with one of the error codes assigned by *CRSP*.

78. Second, to examine whether the price movements of the At-Issue Stocks were also unprecedented relative to prior behavior for the At-Issue Stocks, I compare the stock return of each At-Issue Stock during the week leading up to the proposed Class Period with its own historical returns. **Figure 4** ranks the cumulative return of each At-Issue Stock between January 21 and 27, 2021 against its historical five-day returns during the 25-year period prior to the proposed Class Period. As the figure shows, eight of the At-Issue Stocks posted their largest five-day return in 25 years during the week of January 21 to 27, 2021. For Trivago—the sole stock to have previously seen a larger return—the performance during this period ranked second largest in its five-year trading history.

Figure 4: Cumulative Returns of At-Issue Stocks (1/21/21 – 1/27/21) Relative to Each Stock's Historical Five-Day Performance over the 25-Year Period Prior to the Proposed Class Period

At-Issue Stock	Comparison Period Start	Rank	Five-Day Cumulative Return
Koss Corporation	12/27/95	1st Largest of 1,260	1,591%
GameStop Corp.	2/15/02	1st Largest of 954	788%
Express, Inc.	5/14/10	1st Largest of 539	723%
AMC Entertainment Holdings, Inc.	12/24/13	1st Largest of 357	570%
Bed Bath & Beyond, Inc.	12/27/95	1st Largest of 1,263	112%
BlackBerry Limited	2/5/99	1st Largest of 1,106	96%
Nokia Corporation	12/27/95	1st Largest of 1,263	56%
trivago N.V.	12/22/16	2nd Largest of 206	51%
Tootsie Roll Industries, Inc.	12/27/95	1st Largest of 1,263	44%

Source: *CRSP*
Note: This analysis calculates the cumulative return of each At-Issue Stock over the non-overlapping five-trading-day intervals spanning the period between December 27, 1995 and January 27, 2021. For At-Issue Stocks that began trading on the NYSE or Nasdaq after December 27, 1995, the analysis examines the shorter period that begins when trading data first become available through January 27, 2021. The cumulative return of each At-Issue Stock between January 21 and 27, 2021 is then ranked against the five-day returns each stock posted during the relevant period.

79. **Figure 5** ranks the cumulative return of each At-Issue Stock during the proposed Class Period against its historical six-day returns during the 25-year period prior to the proposed Class Period. As shown in the figure, seven of the At-Issue Stocks experienced their worst six-day cumulative return during the proposed Class Period. For the two stocks to have previously

experienced larger cumulative declines, BlackBerry and Trivago, the performance during the proposed Class Period ranked second and third worst, respectively.

Figure 5: Cumulative Returns of At-Issue Stocks (1/28/21 – 2/4/21) Relative to Each Stock's Historical Six-Day Performance over the 25-Year Period Prior to the Proposed Class Period

At-Issue Stock	Comparison Period Start	Rank	Six-Day Cumulative Return
GameStop Corp.	2/15/02	1st Lowest of 795	-85%
Koss Corporation	1/2/96	1st Lowest of 1,049	-68%
Express, Inc.	5/17/10	1st Lowest of 449	-66%
AMC Entertainment Holdings, Inc.	12/19/13	1st Lowest of 298	-64%
BlackBerry Limited	2/11/99	2nd Lowest of 921	-52%
Bed Bath & Beyond, Inc.	1/2/96	1st Lowest of 1,052	-49%
Nokia Corporation	1/2/96	1st Lowest of 1,052	-33%
Tootsie Roll Industries, Inc.	1/2/96	1st Lowest of 1,052	-27%
trivago N.V.	12/20/16	3rd Lowest of 172	-25%

Source: *CRSP*
Note: This analysis calculates the cumulative return of each At-Issue Stock over the non-overlapping six-trading-day intervals spanning the period between January 2, 1996 and February 4, 2021. For At-Issue Stocks that began trading on the NYSE or Nasdaq after January 2, 1996, the analysis examines the shorter period that begins when trading data first become available through February 4, 2021. The cumulative return of each At-Issue Stock between January 28 and February 4, 2021 is then ranked against the six-day returns each stock posted during the relevant period.

80. Finally, to examine how unusual the price movements exhibited by the At-Issue Stocks as a group were during this meme stock period, I compare the stock price movements of the At-Issue Stocks as a group during the Relevant Period to the price movements of a random group of nine stocks over the past 25 years (prior to the meme stock period). To make this comparison, I perform a simulation to estimate the distribution of cumulative returns (i.e., the range of outcomes) for an investor holding a nine-stock portfolio.[133] My simulation analysis calculates the returns of one million portfolios—each holding nine randomly chosen NYSE/Nasdaq-listed stocks over a random five- or six-day period in the past 25 years—and compares these simulated portfolio returns to the return of a portfolio holding the At-Issue Stocks.[134] **Exhibit 3** shows the

[133] Bootstrapping analysis is a widely used statistical method that employs a simulation to estimate an unknown distribution based on sample data. For an overview of this approach, see A. C. Cameron and P. Trivedi (2005), *Microeconometrics: Methods and Applications*, 1st ed., New York, NY: Cambridge University Press ("Cameron and Trivedi (2005)"), pp. 357–365 ("Exact finite-sample results are unavailable for most microeconometrics estimators and related test statistics. … An alternative approximation is provided by the bootstrap [which] approximates the distribution of a statistic by a Monte Carlo simulation, with sampling done from the empirical distribution or the fitted distribution of the observed data.").
[134] For the At-Issue Stock portfolio and the simulated portfolios, I calculate the portfolio return as the equal-weighted average of each portfolio stock's five- and six-day cumulative return. To perform my simulation analysis, first, I

simulated distribution of five-day portfolio returns historically, as well as the cumulative return of the At-Issue Stock portfolio in the week leading up to the proposed Class Period. As seen in the exhibit, the At-Issue Stock portfolio is the best performer among the one million simulated five-day portfolios calculated in my analysis—that is, it performed better than every single one of the one million randomly sampled portfolios. Whereas the At-Issue Stock portfolio posted a cumulative return of 448%, the best-performing simulated portfolio only returned 167%. Similarly, **Exhibit 4** shows the distribution of six-day simulated portfolio returns yielded by my analysis, as well as the return of the At-Issue Stock portfolio during the proposed Class Period. As seen in the exhibit, the performance of the At-Issue Stock portfolio had the single worst performance among the one million six-day portfolios calculated in my analysis. Whereas the At-Issue Stock portfolio declined -52%, the worst-performing simulated portfolio only experienced a decline of -35%. This analysis shows that during this period, the At-Issue Stocks as a group were an extreme outlier in terms of their stock price performance.

b) Daily Price Movements

81. In addition to analyzing the cumulative returns of the nine At-Issue Stocks, I also analyze each At-Issue Stock's price movements on individual days leading up to and during the proposed Class Period. I analyze daily price movements in two ways: (i) by comparing raw price movements to an At-Issue Stock's historical movements, and (ii) by using a regression model to control for market and industry effects and test statistical significance. Under each method, the At-Issue Stocks have large and highly unusual returns on many individual days.

82. First, I analyze the size of the daily returns posted by the At-Issue Stocks between January 21 and February 4, 2021 by ranking them relative to each stock's daily price movements over the preceding 25 years.[135] **Figure 6** lists the returns posted by the At-Issue Stocks between January 21 and February 4, 2021 that ranked in the top 10 or bottom 10 of returns relative to

randomly sample a five-day period between December 27, 1995 and January 20, 2021 ("Selected Period"). Then, I randomly sample (with replacement) nine stocks from the set of NYSE/Nasdaq-listed stocks or ADRs for which stock return data are available during the Selected Period ("Selected Stocks"). Finally, I calculate the equal-weighted average of the five-day cumulative return for the Selected Stocks during the Selected Period. I repeat this process one million times to create the simulated distribution of equal-weighted average five-day cumulative returns in **Exhibit 3**. I perform a similar analysis using randomly sampled six-day periods between January 2, 1996 and January 19, 2021 to estimate the simulated distribution in **Exhibit 4**.

[135] Specifically, I rank the daily raw returns of each At-Issue Stock between January 2, 1996 and February 4, 2021. For At-Issue Stocks that began trading on the NYSE or Nasdaq after January 2, 1996, I perform this comparison over a shorter period beginning when trading data first become available through February 4, 2021.

their performance over the prior 25 years. As shown in the table, the largest and lowest returns posted by these stocks are clustered during this 11-trading-day period, pointing to the unusual returns of the At-Issue Stocks during this time. For example, the returns on January 27, 2021 for all nine At-Issue Stocks ranked in the top three across each stock's 25-year track record, with seven of these stocks posting their best-ever return during this period on that day. On the next day, January 28, 2021, all At-Issue Stocks posted returns that were in the bottom four, with four stocks posting their largest-ever price declines. Likewise, on February 2, 2021, seven At-Issue Stocks posted record-low returns, with five of these returns ranking in the bottom two of their respective stock's track record.

Figure 6: Top 10 and Bottom 10 Daily Returns of At-Issue Stocks Based on Each Stock's Historical Performance over the 25-Year Period Prior to the Relevant Period

	AMC	BBBY	BB	EXPR	GME	KOSS	NOK	TR	TRVG
Comparison Period Start	12/19/13	12/15/95	2/5/99	5/14/10	2/14/02	12/15/95	12/15/95	12/15/95	12/19/16
Number of Days Analyzed	1,794	6,328	5,536	2,701	4,777	6,315	6,328	6,328	1,039
Week Prior to Proposed Class Period									
1/21/21									
1/22/21				53% [3rd Largest]	51% [5th Largest]				
1/25/21	26% [9th Largest]		28% [6th Largest]	132% [2nd Largest]		80% [3rd Largest]	15% [7th Largest]	16% [2nd Largest]	
1/26/21				-27% [4th Lowest]	93% [2nd Largest]	67% [4th Largest]		10% [6th Largest]	
1/27/21	301% [1st Largest]	43% [1st Largest]	33% [2nd Largest]	214% [1st Largest]	135% [1st Largest]	480% [1st Largest]	38% [1st Largest]	11% [3rd Largest]	52% [1st Largest]
Proposed Class Period									
1/28/21	-57% [1st Lowest]	-36% [1st Lowest]	-42% [2nd Lowest]	-51% [1st Lowest]	-44% [2nd Lowest]	-28% [4th Lowest]	-28% [1st Lowest]	-9% [3rd Lowest]	-22% [3rd Lowest]
1/29/21	54% [2nd Largest]			28% [8th Largest]	68% [3rd Largest]	53% [5th Largest]			
2/1/21					-31% [5th Lowest]	-45% [1st Lowest]			
2/2/21	-41% [2nd Lowest]	-16% [10th Lowest]	-21% [10th Lowest]	-32% [2nd Lowest]	-60% [1st Lowest]	-43% [2nd Lowest]		-17% [1st Lowest]	
2/3/21									
2/4/21	-21% [5th Lowest]				-42% [3rd Lowest]	-27% [5th Lowest]			

Source: *CRSP*
Note: This analysis ranks the daily raw returns of each At-Issue Stock between January 2, 1996 and February 4, 2021. For At-Issue Stocks that began trading on the NYSE or Nasdaq after January 2, 1996, the analysis examines the shorter period that begins when trading data first become available through February 4, 2021. The figure only includes returns posted between January 21 and February 4, 2021 that ranked in the top 10 or bottom 10 during the Relevant Period.

83. Second, I employ a regression analysis to estimate company-specific daily returns for each At-Issue Stock. As mentioned previously, in an efficient market, stock prices are expected to move in response to new, value-relevant information that is expected to change expected cash flows or risks to those cash flows. Such changes can be driven by factors that impact the broad

economy or the industry as a whole, but can also be driven by company-specific reasons. To isolate company-specific "abnormal" returns, I employ regression analysis, a technique widely used in the academic literature when analyzing stock returns.

84. Regression analysis allows one to control for factors such as market-wide and industry-wide developments and to isolate the portion of daily stock price movements that are company-specific.[136] A widely used factor regression model can be constructed by using market and industry index returns as the two factors. Isolating company-specific returns is a key step in the event study methodology, and two-factor models are commonly used and widely accepted for this purpose.[137]

85. This method involves running a regression of the security returns on non-company-specific factors that affect the security returns (i.e., overall market movements and industry movements). The model is typically run over a control period in order to estimate expected or "normal" price movements and to determine the normal level of variation. Assuming the normal relationship estimated over a control period continues to hold, one can use market and industry movements during the period of interest (here, the Relevant Period) to estimate the expected returns of the At-Issue Stocks.

86. The "abnormal" return (also referred to as the "residual" return) is then calculated as the difference between the "normal" return and the stock's actual return during a given time period. The regression analysis can also be used to estimate the "normal" level of variation in residual returns and apply statistical tests to determine which estimated daily abnormal price movements are statistically significant.[138] Further details of my regression methodology can be found in **Appendix D**.

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[136] Ross et al. (2002), p. 298 ("Although the bulk of our presentation in this chapter focused on the one-factor model, a multifactor model is probably more reflective of reality. That is, one must abstract from many marketwide and industrywide factors before the unsystematic risk of one security becomes uncorrelated with the unsystematic risks of other securities").

[137] A.C. MacKinlay (1997), "Event Studies in Economics and Finance," *Journal of Economic Literature*, 35(1), pp. 13–39 ("MacKinlay (1997)") at pp. 15, 18 ("Appraisal of the event's impact requires a measure of the abnormal return. The abnormal return is the actual ex post return of the security over the event window minus the normal return of the firm over the event window."; "A number of other statistical models have been proposed for modeling the normal return. A general type of statistical model is the *factor model*. … The market model is an example of a one factor model. Other multifactor models include industry indexes in addition to the market.").

[138] In this report, statistical significance is determined using a 95% confidence interval. See e.g., D. Rubinfeld (2011), "Reference Guide on Multiple Regression," in *Reference Manual on Scientific Evidence*, 3rd ed., Washington, DC: Federal Judicial Center, p. 320 ("In most scientific work, the level of statistical significance required to reject the null hypothesis (i.e., to obtain a statistically significant result) is set conventionally at .05, or 5%.").

87. Here, I have used a period that is uncontaminated by the potential "meme stock" phenomenon as the control period to model the expected company-specific returns of these stocks had the trading behavior of these At-Issue Stocks remained unaffected by such a phenomenon. Specifically, I use 120 trading days ending on December 31, 2020 as the control period. Using a control period that precedes the time period at issue is a standard approach used in academic research.[139]

88. As mentioned above, one assumption when using the control period to estimate expected returns is that the estimated "normal relationship" continues to hold during the period of interest (here, the Relevant Period). In this case, the Relevant Period was highly unusual, with prices exhibiting extreme volatility and with price movements attributed to factors such as retail coordination through social media and short squeezes or attempted short squeezes, rather than new, value-relevant information. Indeed, the manner in which the prices of the At-Issue Stocks fluctuated or traded relative to the market or industry movements during this unusual period could be expected to deviate from their normal historical behavior.

89. In other words, to the extent that coordinated trading and potential short squeezes posed a severe impediment to market efficiency, they could also cause a drastic change in the stock return volatility and how these stocks co-moved with market and industry factors. This means that a model that calibrates the expected returns using the data from the "normal" period may no longer predict accurately how the returns are expected to move in this highly unusual period.[140]

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[139] For example, in the context of event studies, MacKinlay (1997) states, "Given the selection of a normal performance model, the estimation window needs to be defined. The most common choice, when feasible, is using the period prior to the event window for the estimation window. For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event. Generally the event period itself is not included in the estimation period to prevent the event from influencing the normal performance model parameter estimates" (MacKinlay (1997), p. 15).

[140] Indeed, I find evidence of structural breaks in volatility and in the relationship between the movement of the At-Issue Stocks and the movement of the market and industry. A "structural break" occurs when the relationship between the data examined (in this analysis, the At-Issue Stock returns) and their explanatory variables (in this analysis, the market and industry factors) are not constant throughout the period being analyzed. See W. Greene (2008), *Econometric Analysis*, 6th ed., Upper Saddle River, NJ: Pearson Education ("Green (2008)") at p. 120 ("In specifying a regression model, we assume that its assumptions apply to all the observations in our sample. It is straightforward, however, to test the hypothesis that some of or all of the regression coefficients are different in different subsets of the data."). I use a Brown-Forsythe test to determine whether the volatility of the residual returns of the At-Issue Stocks during the 120-trading-day period ending December 31, 2020 (July 14 to December 31) was equal to the volatility of the residual returns during the period from January 21 to February 4, 2021. I find that the F-statistic of the Brown-Forsythe test is statistically significant at the 5% level for all At-Issue Stocks. As a result, I can reject the null hypothesis that the volatility during the two comparison periods was equal. See M.B. Brown and A.B. Forsythe (1974), "Robust Tests for the Equality of Variances," *Journal of the American Statistical Association*, 69(346), pp. 364–367 ("In many statistical applications a test of the equality of variances is of interest. … Unfortunately, the common *F*-ratio and Bartlett's test are very sensitive to the assumption that the underlying populations are from a Gaussian distribution. …[T]he equality of variances in long-tailed distributions can best be

However, that is exactly the point: when examining market efficiency during the Relevant Period, I estimate the regression model using data from the normal period insulated from these factors that could cause the prices to deviate from their efficient levels. This would allow one to isolate "abnormal" returns potentially arising from the factors that could lead to market inefficiency.

90. My regression analysis shows that many of the At-Issue Stocks had large, statistically significant residual returns on multiple days leading up to and during the proposed Class Period (**Figure 7**).[141]

Figure 7: Daily Residual Returns for At-Issue Stocks from a Two-Factor Model Estimated over a 120-Trading-Day Period Ending 12/31/20

	AMC	BBBY	BB	EXPR	GME	KOSS	NOK	TR	TRVG
Week Prior to Proposed Class Period									
1/21/21	4%	5%	0%	1%	9%	1%	1%	1%	4%
1/22/21	**15%***	**11%***	**9%***	**57%***	**51%***	-6%	0%	1%	2%
1/25/21	**21%***	1%	**28%***	**135%***	**17%***	**79%***	**15%***	**14%***	1%
1/26/21	**14%***	**21%***	5%	**-23%***	**91%***	**66%***	-2%	**9%***	-3%
1/27/21	**298%***	**49%***	**35%***	**220%***	**139%***	**480%***	**39%***	**12%***	**54%***
Proposed Class Period									
1/28/21	**-54%***	**-40%***	**-43%***	**-58%***	**-47%***	**-27%***	**-27%***	**-9%***	**-26%***
1/29/21	**59%***	**9%***	-2%	**32%***	**70%***	**53%***	-1%	**4%***	5%
2/1/21	-2%	**-14%***	1%	**-16%***	**-34%***	**-47%***	**5%***	**-5%***	-8%
2/2/21	**-34%***	**-20%***	**-23%***	**-37%***	**-64%***	**-44%***	**-8%***	**-17%***	-6%
2/3/21	**13%***	**8%***	4%	3%	1%	**24%***	4%	**3%***	5%
2/4/21	**-20%***	**-8%***	0%	-13%	**-46%***	**-28%***	**-8%***	-2%	-7%

Source: *Bloomberg*; *CRSP*; 10-K filings of At-Issue Stocks; Refinitiv Eikon
Note: A two-factor model is estimated for each At-Issue Stock over the 120-trading-day period ending on December 31, 2020. The model regresses the daily dividend-adjusted returns of each At-Issue Stock on the total returns of the S&P 500 Index and an industry index. The industry index for each At-Issue Stock is identified using its FY2020 and FY2021 SEC filings. If the company identified in its SEC filings an industry index for the purpose of stock performance comparisons, then that index is used to control for industry movements in the regression model. If the company did not identify such an index in its SEC filings, then an equal-weighted index of the U.S. exchange-traded competitors identified in its SEC filings is used. The industry index returns are orthogonalized with respect to the S&P 500 returns. Statistical significance of residual returns is determined at the 5% level using a two-tailed test.

91. During the five trading days before the proposed Class Period, seven of the nine At-Issue Stocks had three or more days with statistically significant residual returns, which, except for

tested by a statistic of the form of [the 10%-trimmed mean] and asymmetric distributions by a statistic similar to [the median]."). In addition, I test whether there was a change in the relationship between the returns of the At-Issue Stocks and the returns of the market and industry indices by performing a Chow test, which is a statistical test for whether the regression model coefficients jointly changed during two comparison periods. After performing this test, I find the F-statistic is statistically significant at the 5% level for all At-Issue Stocks, leading me to reject the null hypothesis that there was no change in the model coefficients between the two comparison periods. See Green (2008), p. 130 ("One of the more common applications of the *F* test is in tests of structural change. … This test is often labeled a Chow test, in reference to Chow (1960)." (emphasis removed)).

[141] See **Appendix D** for additional information regarding my two-factor model.

Express's return on January 26, 2021, were all positive. For example, GameStop posted positive and statistically significant residual returns on each day between January 22, 2021 and January 27, 2021 that ranged from 17% to 139% (**Figure 7**). For perspective, to get a sense of the likelihood of observing this pattern due to random chance, the probability of observing four out of five returns being statistically significant at the 5% level by random chance would be 0.003% (less than 1 in 30,000).[142] A similar pattern is seen during the proposed Class Period but with negative, statistically significant returns on multiple days for most of the At-Issue Stocks. During the six trading days in the proposed Class Period, seven of the nine At-Issue Stocks had four or more days with statistically significant residual returns.

c) Trading Volume and Volatility

92. These extreme price movements exhibited by the At-Issue Stocks were accompanied by very large increases in trading volume and volatility, with each of the At-Issue Stocks experiencing higher trading volume and volatility during this period than they had historically.

93. **Exhibit 5** presents the At-Issue Stocks' turnover ratios, which is the number of shares traded on a given day as a percentage of the company's total outstanding shares. The exhibit shows that the At-Issue Stocks' turnover ratios during this period were extremely high, both relative to the behavior of a typical stock and relative to historical values for these stocks.

94. On three days during the week starting January 21, 2021, GameStop had a turnover ratio of more than 200%, indicating that trading volume on a given day was *double* the total shares outstanding. AMC, Express, GameStop, Koss, and Nokia all experienced at least one day with turnover greater than 100% during this time. The turnover for the six At-Issue Stocks during this period that traded on NYSE (AMC, BlackBerry, Express, GameStop, Nokia, and Tootsie Roll) far exceeded the turnover typically found for stocks traded on NYSE.[143] As shown by Hrdlicka (2022), in 2017, the most recent year analyzed in the study, the mean *annual* turnover for a stock traded on NYSE was approximately 250%.[144] Both GameStop and Express had turnover on

[142] Assuming that a statistically significant residual return occurs by chance 5% of the time, the odds of seeing four statistically significant residual returns in a five-day period can be calculated using the binomial distribution (M.H. DeGroot and M.J. Schervish (2012), *Probability and Statistics*, 4th ed., Boston, MA: Pearson, p. 277).
[143] C. Hrdlicka (2022), "Trading Volume and Time Varying Betas," *Review of Finance*, 26(1) pp. 79–116 ("Hrdlicka (2022)") at p. 92 (Figure 2).
[144] Hrdlicka (2022), p. 92 (Figure 2). Hrdlicka (2022) found that in 2017, 75% of stocks had an annual turnover below approximately 300%.

multiple individual days that was consistent with the turnover most stocks experience in an entire year. Specifically, GameStop's daily turnover on January 22, January 25, and January 26, 2021 ranged from 255% to 283%. Express's daily turnover on January 25, 2021 and January 27, 2021 was 552% and 443%, respectively.

95. Similarly, the turnover for the three At-Issue Stocks during this period that traded on Nasdaq (Bed Bath & Beyond, Koss, and Trivago) far exceeded the turnover typically found for stocks traded on U.S. exchanges. As shown by Liu et al. (2020), between 1972 and 2014, the mean turnover on an annual basis (adjusted to avoid double counting)[145] for stocks traded on NYSE, Amex, or Nasdaq was 89%.[146] Koss's adjusted turnover on January 26, 2021 of 287% was more than triple the turnover the average stock experienced in an entire year.[147] The turnover each At-Issue Stock experienced was also an order of magnitude higher than its mean daily turnover over the previous year. For example, while Express's mean daily turnover was 5% in the year ending January 20, 2021, it increased to 247% in the week prior to the proposed Class Period, and was 62% during the proposed Class Period.

96. In addition, consistent with the structural break in volatility discussed above,[148] the volatility of the At-Issue Stocks increased dramatically leading up to and during the proposed Class Period. **Exhibit 6** shows the equity option implied volatility, a forward-looking volatility measure calculated using options prices that captures market expectations for the stock's *future* volatility, for each of the nine At-Issue Stocks.[149] As shown in the exhibit, implied volatility increased sharply for each of the stocks in the week prior to the proposed Class Period, peaking for all but AMC on January 27, 2021. For GameStop, for example, implied volatility rose from

[145] "To address the issue of double counting of volume for Nasdaq stocks, we follow Anderson and Dyl (2005) and scale down the volume of Nasdaq stocks by 50% before 1997 and 38% after 1997 to make it roughly comparable to the volume on the NYSE" (B. Liu et al. (2020), "Time-Varying Demand for Lottery: Speculation Ahead of Earnings Announcements," *Journal of Financial Economics*, 138(3), pp. 789–817 ("Liu et al. (2020)"), p. 796).

[146] Liu et al. (2020) finds that the mean monthly turnover for a stock traded on Nasdaq (adjusted to avoid double counting) was 7.432%, with 75% of stocks having monthly turnover below 9.078%. A monthly turnover of 7.432% is 89% on an annualized basis. See Liu et al. (2020), p. 796. Note that the article "winsorizes" the turnover at the 1st and 99th percentile, but this does not impact the 75th percentile. A statistics textbook explains winsorization: "Distributions with very long tails or isolated outlying values can disturb the effectiveness of methods based on the normal distribution. Trimming involves the discarding of a proportion of sample observations at the two extremes before calculation of a mean. Winsorization involves the replacement of the discarded values by the most extreme retained values" (R. Wilcox (2005), "Trimming and Winsorization," *Encyclopedia of Biostatistics*, Wiley Online Library, July 15, 2005, available at https://onlinelibrary.wiley.com/doi/abs/10.1002/0470011815.b2a15165).

[147] Koss's daily turnover on January 26, 2021 was 464%, or 287% after scaling by 38% to address double counting of Nasdaq volume following the academic literature.

[148] See fn. 140.

[149] The implied volatility is calculated using 30-day at-the-money call options, which will measure volatility expectations over the next month.

169% on January 21, 2021 to 513% as of close on January 27, 2021. BlackBerry's implied volatility more than tripled over the same period, increasing from 138% to 458% while Bed Bath & Beyond's implied volatility increased from 75% to 298%. For perspective, the market's volatility, as measured by the VIX index, changed only from 21% to 37% during the same period.[150]

2. Extreme Price Run-Ups and Declines during This Period Cannot Be Explained by New, Value-Relevant Information

97. In a semi-strong form efficient market, an economist would expect the large price changes discussed above to be driven by new, value-relevant information about the company's financial or business conditions that would cause investors to revise their estimates of cash flows or the risks to those cash flows. However, I find that new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the span of two weeks leading up to and during the proposed Class Period.

98. Six of the nine at-issue companies issued contemporaneous press releases or made statements in their subsequent financial filings discussing their price movements during this period and the lack of explanatory news. Several stated that they were unaware of changes in their business conditions that would explain the price movements prior to or during the proposed Class Period, while others stated that they were unaware of any *undisclosed* information that would account for the price movements. These statements included the following:

> **BlackBerry**
> The Company is not aware of any material, undisclosed corporate developments and has no material change in its business or affairs that has not been publicly disclosed that would account for the recent increase in the market price or trading volume of its common shares.[151] (BlackBerry Press Release, January 25, 2021)

[150] Refinitiv Eikon.

[151] "BlackBerry Comments on Trading Activity at Request of the Industry Regulatory Organization of Canada," *BlackBerry*, January 25, 2021, available at https://www.blackberry.com/us/en/company/newsroom/press-releases/2021/blackberry-comments-on-trading-activity-at-request-of-the-industry-regulatory-organization-of-canada.

Nokia

Nokia is not aware of any material, undisclosed corporate developments or material change in its business or affairs that has not been publicly disclosed that would account for the recent increase in the market price or trading volume of its shares.[152] (Nokia Form 6-K, January 27, 2021)

AMC

The market prices and trading volume that our shares of Class A common stock have recently experienced, and may continue to experience and extreme volatility could cause purchasers of our Class A common stock to incur substantial losses. … Significant fluctuations in the market price of our Class A common stock have been accompanied by reports of strong and atypical retail investor interest, including on social media and online forums. … We may continue to incur rapid and substantial increases or decreases in our stock price in the foreseeable future that may not coincide in timing with the disclosure of news or developments by or affecting us.[153] (AMC 10-K, March 12, 2021)

GameStop

Stock markets in general and our stock price in particular have recently experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies and our company. … During this time, we have not experienced any material changes in our financial condition or results of operations that would explain such price volatility or trading volume.[154] (GameStop 10-K, March 23, 2021)

Express

Significant fluctuations in the market price of our common stock have been accompanied by reports of strong and atypical retail investor interest, including on social media and online forums. … We may continue to incur rapid and substantial increases or decreases in our stock price in the foreseeable future that may not coincide in timing with the disclosure of news or developments by or affecting us. Accordingly, the market price of our shares of common stock may fluctuate dramatically, and may decline rapidly, regardless of any developments in our business.[155] (Express Form 10-K, March 25, 2021)

Koss

Our stock price and trading volume has recently been extremely volatile and may be volatile in the future for reasons unrelated to our operating performance or prospects and, as a result, investors in our common stock could incur substantial losses. … A short squeeze has led and could continue to lead to volatile price

[152] Nokia Corp., Form 6-K, filed January 27, 2021.
[153] AMC Entertainment Holdings, Inc., Form 10-K for FY 2020, filed March 12, 2021, pp. 35, 36.
[154] GameStop Corp., Form 10-K for FY 2020, filed March 23, 2021, p. 15.
[155] Express Inc., Form 10-K for FY 2020, filed March 25, 2021, pp. 26, 27.

> movements in shares of our common stock that are unrelated or disproportionate to our operating performance or prospects and, once investors purchase the shares of our common stock necessary to cover their short positions, the price of our common stock may rapidly decline.[156] (Koss Form 10-Q, May 13, 2021)

99. In summary, the fact that six of the nine at-issue companies issued contemporaneous press releases or made statements in their subsequent financial filings on these price movements shows that the companies themselves were informing the market that the large price movements they were experiencing, often the largest in the past 25 years, could not be explained by new, value-relevant information. Instead, some of the companies attributed these large price movements to a "short squeeze" and "retail investor interest, including on social media and online forums."[157]

100. I conducted an analysis to identify the total mix of new information in the market about the financial or business conditions of each of the nine At-Issue Stocks that might have impacted stock prices during the Relevant Period.[158] To do so, I reviewed all analyst reports covering the at-issue companies that were issued between January 1, 2021 and March 31, 2021 available through the Refinitiv Eikon and Capital IQ databases.[159, 160] I also conducted a search in Factiva, a database of news articles, to identify all articles mentioning the company name or indexed to the tickers of the nine at-issue companies published between January 21, 2021 and February 4, 2021.[161] Finally, I reviewed each company's press releases and SEC filings, including all Form

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[156] Koss Corporation, Form 10-Q for Q3 2020, filed May 13, 2021, p. 17.
[157] AMC Entertainment Holdings, Inc., Form 10-K for FY 2020, filed March 12, 2021, pp. 35, 36; Koss Corporation., Form 10-Q for Q3 2021, filed May 13, 2021, p. 17.
[158] When I use the term "value-relevant information," I am referring to public, value-relevant information. As I discuss above, I understand that prices in a semi-strong form efficient market always fully reflect all publicly available information. See ¶ 644 above.
[159] I reviewed reports from the following contributors: ABG Sundal Collier, Argus, Ascendiant, Avise Analytics, Benchmark, BNP Paribas, BTIG, Banco Santander, BofA Securities, Barclays, Barrington, CFRA, CIBC, Canaccord Genuity, CL King, Cowen, Craig-Hallum, Credit Suisse, DNB Markets, Deutsche Bank, Fundamental Research Corp., Guggenheim, Insight Partners, JPMorgan, Jefferies, Kepler Cheuvreux, Liberum, Loop Capital Markets, MKM Partners, Macquarie, Morgan Stanley, New Street, Northland, ODDO BHF Corporates & Markets, Royal Bank of Canada, Raymond James, Rosenblatt, S3 Partners, SEB, Scotiabank, Societe Generale, Susquehanna, TD Securities, Telsey Advisory Group, Trefis, Truist Securities, UBS, UniCredit, Wedbush, Wells Fargo, and William Blair. I did not review reports from contributors that typically only provide a quantitative report without any commentary from an analyst.
[160] Neither Refinitiv Eikon nor Capital IQ lists any analyst reports for Koss, other than those from contributors that typically only provide a quantitative report without any commentary from an analyst.
[161] I include public press articles extracted from a Factiva search of all publications with "AMC Entertainment", "Bed Bath & Beyond", "BlackBerry Ltd", "Express Inc", "GameStop Corp", "Koss Corp", "Nokia Corp", "Tootsie Roll Industries" or "Trivago NV" in the headline or lead paragraph, or indexed to "AMC", "BB", "BBBY", "EXPR", "GME", "KOSS", "NOK", "TR", or "TRVG" between January 21, 2021 and February 4, 2021.

8-Ks (and for ADRs, 6-Ks) and Form 4s, 13Ds, and 13Gs issued between January 1, 2021 and February 28, 2021, and each company's most recent quarterly filings, Form 10-K or 10-Q (or 20-F for ADRs), issued prior to and following the proposed Class Period.

101. For Express, GameStop, Tootsie Roll, and Trivago, I find that none of the statistically significant residual stock returns[162] were accompanied by new, potentially value-relevant information. For AMC, Bed Bath & Beyond, BlackBerry, Koss, and Nokia, while I have identified certain company-specific information on certain days with statistically significant residual stock returns,[163] my analysis shows that the overall extreme stock price run-up and subsequent reversal during the Relevant Period cannot be explained by that information. Based on my analysis in **Appendix E** and **Appendix F**, I find that new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the span of two weeks leading up to and during the proposed Class Period. As I discuss in **Sections VI.C** and **VI.D** below, analysts, academic studies, other observers, and Plaintiffs discussed evidence of retail investor coordination, (attempted) short squeezes, and short-sale constraints, which are inconsistent with a finding of market efficiency.

102. In line with this, analyst reports issued during or discussing this period commented on the disconnect between changes in stock prices and new, value-relevant information for many of these stocks, and further commented on the fact that this disconnect continued into the proposed Class Period. Also, as explained in **Sections VI.C** and **VI.D** below, analyst reports attributed the price movements to retail investor coordination and short squeezes or attempted short squeezes. Select commentary is presented below, and in **Exhibit 7**.

> Our view is that the move in BlackBerry's shares appears to be overdone in the short-term given fundamentals of the business relative to the movement in the underlying share price.[164] (Scotiabank, January 27, 2021)

> Over the last five days Nokia shares are up by more than 30% on materially higher-than-average trading volumes, mainly driven by US retail investors buying

[162] I use the two-factor regression models discussed in **Appendix D** to identify days that have statistically significant residual returns.
[163] I use the two-factor regression models discussed in **Appendix D** to identify days that have statistically significant residual returns.
[164] "Lowering Recommendation on Significant Market Move," *Scotiabank*, January 27, 2021, p. 1.

shares on the recommendations of online trading platforms. We have seen no company-specific or market-related developments that would warrant such a reaction in the shares, which does not appear to be fundamentally based.[165] (ABG Sundal Collier, January 28, 2021)

Downgrading Shares of Bed Bath & Beyond to Market Perform from Outperform: In our view, Bed Bath & Beyond's share price increase of ~120% in the past three months—and up ~150% since our upgrade to Outperform on October 29, 2020 at $21.10—far exceeds our high fundamental expectations and projected multiyear benefits from the company's transformation. In fact, the recent increase in the share price has raised the company's EV/EBITDA (NTM) valuation multiple to ~17x, according to FactSet, which is well above its 10-year average of ~7x and 10-year peak of 8x (pre-2020).[166] (Telsey Advisory Group, January 28, 2021)

In our view, the recent volatility and spike in the company's stock, thanks to the Reddit/WallStreetBets crowd, has decoupled AMC's share price and its valuation. … The emotion behind the #SaveAMC movement could carry the shares higher in the near-term, but we believe this valuation-be-damned momentum is not sustainable over the long term.[167] (MKM Partners, February 1, 2021)

In our last note, we argued that while [GameStop] shares do not appear to be trading on fundamentals (which are very challenged) they should in time, and many of the turnaround [opportunities] touted by bulls may not materialize. It is difficult to predict the day-to-day moves of GME shares but they are down 81% from highs and several factors that we believe have been instrumental in increasing share price (such as daily volume, short interest and online conversations) appear to be turning. We think fundamentals will again factor into valuation and note that at current price of $92 and GME's 5yr avg EV/EBITDA of 3.7x, the implied EBITDA is $1.6bn vs. $(65)mn in '20. We maintain Underperform and $10 PO.[168] (BofA Securities, February 4, 2021)

Mid-January brought outsized share gains in AMC, with some sympathy trading in competitor shares late-January, driven by momentum unrelated to the company's fundamentals.[169] (Wedbush, March 15, 2021)

[165] "Sell on retail hype," *ABG Sundal Collier*, January 28, 2021, p. 1.
[166] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021, p. 1.
[167] "Downgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021, p. 1.
[168] "When fundamentals still appear on the sidelines, what other factors matter," *BofA Securities*, February 4, 2021, p. 1.
[169] "Movies and Entertainment," *Wedbush*, March 15, 2021.

103. Analysts generally maintained stable quantitative financial forecasts for each company's future performance. **Exhibit 8** shows mean, median, and individual analyst forecasts for revenue and EBITDA for seven of the nine At-Issue Stocks (forecasts were unavailable for Tootsie Roll or Koss, which did not have any analyst reports during the relevant time period).[170] The exhibits show that analysts had a wide range of forecasts, and updated their forecasts frequently, but none of those seven At-Issue Stocks had forecast changes that could explain the stock price movements immediately prior to and during the proposed Class Period. Analyst forecasts for BlackBerry, Express, and GameStop remained flat between January 21, 2021 and February 11, 2021. Additionally, analysts did not change their forecasts for Nokia until Nokia's financial results were released on February 4, 2021, which was after Robinhood's trading restriction on Nokia was lifted. In order to explain the large stock price run-up and reversal that the At-Issue Stocks experienced over the span of two weeks in an efficient market, there would need to be positive, value-relevant developments in the week prior to the proposed Class Period, followed by negative, value-relevant developments during the proposed Class Period. However, for the At-Issue Stocks that did experience changes in analyst forecasts (AMC, Bed Bath & Beyond, and Trivago), there were no analysts who raised their forecasts in the week prior to the proposed Class Period and lowered their forecasts during the proposed Class Period. The lack of analyst forecast changes is inconsistent with what one would expect if the stock price run-up and reversal were due to new, value-relevant information.

104. Public press articles similarly commented on the large price movements in the absence of new, value-relevant information, and described the price movements as detached from value-relevant information (which again, extended into the proposed Class Period). Select commentary is presented below, and in **Exhibit 9**.

> Names like GameStop, BlackBerry, and AMC have soared with little fundamental news behind the moves. …[S]hares of GameStop soared as much as 145% in Monday trading on no apparent news.[171] (Business Insider, January 25, 2021)

[170] Refinitiv Eikon does not have individual analyst forecasts available for Koss or Tootsie Roll at any point between October 1, 2020 and March 31, 2021.

[171] "From AMC to Bed Bath & Beyond, the market's most-shorted stocks are rallying as Reddit day-traders pile in," *Business Insider*, January 25, 2021.

The findings come as a handful of stocks like GameStop, AMC Entertainment, and Bed Bath & Beyond are soaring hundreds of percentage points with little fundamental news behind the moves.[172] (Business Insider, January 26, 2021)

[Koss's] sudden and meteoric rise follows rallies in the share price of companies like GameStop, BlackBerry, and AMC Entertainment, which have surged hundreds of percentage points in recent weeks with little fundamental news behind the moves.[173] (Business Insider, January 26, 2021)

The investor group whose concerted action has apparently created a short squeeze in the stock of videogame retailer GameStop Inc. is also targeting shares of AMC Entertainment Inc., BlackBerry Ltd and retailer Express Inc., all of which are seeing sharp moves without any apparent news to act as a driver.[174] (MarketWatch, January 26, 2021)

Professional investors are worried: How can financial markets function when stock movements are so obviously disconnected from fundamentals, played by both sides like a videogame?[175] (Dow Jones Institutional News, January 26, 2021)

Nokia stock (ticker: NOK) shares has rallied more than 70% this week – including gain of more than 50% on Wednesday – without any fundamental basis.[176] (Dow Jones Institutional News, January 27, 2021)

Shares of AMC Entertainment Holdings Inc. AMC, BlackBerry Ltd. BB, headphone maker Koss Corp. KOSS and retailer Express Inc. EXPR have all experienced sharp moves without any apparent news to act as a driver, while facing a large amount of bets against them.[177] (MarketWatch, January 27, 2021)

"The market is acting crazy," Harris [O'Neil Capital Management portfolio manager] said of the AMC stock and GME stock frenzy. "I never thought I'd see a repeat of the performance of the internet bubble. But I did, and what's happening in the market now feels a lot like those times where entire groups are moving up irrespective of fundamentals." … "These are the crazy things that can happen," Harris said of the retail frenzy behind GME stock and AMC stock. "The

[172] "Increased retail trading is 'largely responsible' for elevated stock prices and record-high options activity, says Deutsche Bank," *Business Insider,* January 26, 2021.
[173] "Koss shoots 131% higher as tweet pegs the small-cap headphones maker as a possible next WallStreetBets darling," *Business Insider*, January 26, 2021.
[174] "Here are some of the other stocks seeing GameStop-like short squeezes," *MarketWatch*, January 26, 2021.
[175] "The Day-Trading Barbarians at the Gate Won't Sack Wall Street -- Heard on the Street – Update," *Dow Jones Institutional News*, January 26, 2021.
[176] "Nokia Stock Is Surging. The Company Says It Can't Explain It," *Dow Jones Institutional News*, January 27, 2021.
[177] "U.S. stocks book worst daily losses since October as Powell stresses long road to recovery and short squeeze drama plays out," *MarketWatch*, January 27, 2021.

> market has a way of rooting out inefficiencies."[178] (Investor's Business Daily, January 28, 2021)
>
> From AMC to Bed Bath & Beyond to Blackberry, several stocks are seeing their stock prices surge, in contrast to what their company performance would suggest.[179] (Wall Street Journal, January 29, 2021)
>
> One issue is that the recent short squeeze—which have sent other stocks, including AMC, Bed Bath & Beyond, Macy's, and Stitch Fix, flying—doesn't reflect any underlying change in fundamentals that would point to a sustainably better future for the companies at the heart of the frenzy.[180] (Barron's Online, February 2, 2021)
>
> "The fundamentals are well known and obviously the stock prices have detached from the fundamentals," said Stephen Massocca, senior vice president at Wedbush Securities. "I have told people just stay away, it is dynamite and who knows when, how or where it blows up."[181] (Reuters News, February 3, 2021)

105. In summary, I find that new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the span of two weeks leading up to and during the proposed Class Period.

C. Analysts, Academic Studies, Other Observers, and Plaintiffs Attributed the Price Movements to Retail Investors Coordinating via Social Media, Which Is Inconsistent with Market Efficiency

106. The large price movements discussed above were attributed by analysts, academic studies, other observers, and even Plaintiffs, to factors such as retail investors coordinating on social media. Below, I first discuss the academic literature on the contribution of different types of traders to price discovery and the implications of coordinated trading for market efficiency. I then show that analysts, academic studies, other observers, and Plaintiffs comment on the existence of coordinated trading by investors during this period, and discuss the potential impact

[178] "Short Squeeze Volatility With GME, AMC: O'Neil Portfolio Manager On Navigating Risk In 'Crazy' Market," *Investor's Business Daily*, January 28, 2021.
[179] "GameStop Stock, Reddit and Robinhood: What You Need to Know; How traders online drove the videogame retailer's stock to new highs and caused a crazy week in markets," *Wall Street Journal*, January 29, 2021.
[180] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.
[181] "WRAPUP 8-'Reddit rally' stocks bounce on day after selloff, then dip after hours," *Reuters News*, February 3, 2021.

of such coordinated trading on the prices of the At-Issue Stocks leading up to and during the proposed Class Period. The existence of coordinated trading that did not incorporate new, value-relevant information but that impacted prices during the Relevant Period would be inconsistent with market efficiency for the At-Issue Stocks.

1. Investor Coordination and Market Efficiency

107. As mentioned above in **Section VI.A**, market efficiency is fostered by a well-functioning arbitrage mechanism. Even though not all market participants have the same level of sophistication or can process information equally well, the existence of sophisticated investors such as arbitrageurs and their ability to process and trade on information competitively acts to correct "mispricing" and drive prices to a level that is commensurate with value-relevant information.

108. Academic research has investigated the trading activity and behavior of different types of investors. Institutional investors are typically seen as being more informed and having a larger role in trading to incorporate value-relevant information into prices. Institutional investors, who are largely professional financial institutions and organizations managing and trading large accounts on behalf of others, tend to trade in larger amounts than retail investors.[182] Due to their size and the fact that they are managed by professionals, institutional investors are also typically thought to be better equipped to access and process value-relevant information than retail traders.[183] Studies have also found that trading by institutional investors can have an important influence on market liquidity and price discovery, in particular through acting as "arbitrageurs" that help quickly impound value-relevant information into securities prices.[184]

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[182] "Who Counts as a Retail Investor?," *Nasdaq*, December 17, 2020, available at https://www.nasdaq.com/articles/who-counts-as-a-retail-investor-2020-12-17.

[183] B.M. Barber and T. Odean (2008), "All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors," *Review of Financial Studies*, 21(2), pp. 785–818 at p. 787.

[184] See e.g., S. Chakravarty (2001), "Stealth-trading: Which traders' trades move stock prices?" *Journal of Financial Economics*, 61(2), pp. 289–307. Chen et al. (2020) documents that hedge funds scale up information acquisition when analyst coverage shrinks, mitigating impairment of market efficiency (Y. Chen, B. Kelly, and W. Wu (2020), "Sophisticated investors and market efficiency: Evidence from a natural experiment," *Journal of Financial Economics*, 138(2), pp. 316–341("Chen et al. (2020)")). Bai et al. (2016) similarly find that stocks with high and increasing institutional ownership have higher price informativeness (J. Bai, T. Philippon, and A. Savov (2016), "Have financial markets become more informative?" *Journal of Financial Economics*, 122(3), pp. 625–654 ("Bai et al. (2016)")). Boehmer and Kelley (2009) and Kokkonen and Suominen (2015) document similar evidence that institutions improve price efficiency and reduce market mis-valuations (E. Boehmer and E. Kelley (2009), "Institutional Investors and the Informational Efficiency of Prices," *Review of Financial Studies*, 22(9), pp. 3563–3594 ("Boehmer and Kelley (2009)"; J. Kokkonen and M. Suominen (2015), "Hedge Funds and Stock Market Efficiency," *Management Science*, 61(12),

109. By contrast, academic research on individual retail investors suggests that they are less informed.[185] Even though competition in the market means that these retail traders "cannot affect prices too much, and even if they can, will not do so for long," academic research has also recognized that these less informed or "noise" (and often retail) investors themselves could pose risks to arbitrageurs.[186] As discussed in a well-cited article, DeLong et al. (1990), "an arbitrageur selling an asset short when bullish noise traders have driven its price up must remember that noise traders might become even more bullish tomorrow, and so must take a position that accounts for the risk of a further price rise when [the arbitrageur] has to buy back the stock. This risk … must be borne by any arbitrageur with a short time horizon and must limit [the arbitrageur's] willingness to bet against noise traders."[187] The DeLong et al. (1990) research raises the possibility that when "noise trader" views are unpredictable and extreme, the "destabilizing speculation" of this type of investors' trading can lead to situations where these traders in the short term make large profits despite their actions to "distort" prices. As a result, stock prices temporarily exhibit excess volatility and large divergence from what is implied by value-relevant information because of this risk to arbitrage, but eventually revert back to the normal level.[188]

110. Recent academic studies assessing market activity in the meme stocks episode have further analyzed trading by investors who share information and investment ideas via social media.[189] Unlike prior research where the "destabilizing speculation" was due to unpredictable, noisy views of less sophisticated investors, more recent academic studies, such as Pedersen (2022), model the speculation taking into account predictability in price movements due to social media coordination. In such studies, investor coordination driven by social media can lead to situations where stocks temporarily experience excess price volatility, and prices do not quickly and fully incorporate value-relevant information, which is inconsistent with market efficiency.

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pp. 2890–2904 ("Kokkonen and Suominen (2015)"). Finally, Cao et al. (2018) find that hedge funds act as arbitrageurs who reduce mispricing by investing in stocks that are relatively inefficiently priced ("Hedge Fund Holdings and Stock Market Efficiency," *Review of Asset Pricing Studies*, 8(1), pp. 77–116 ("Cao et al. (2018)")).

[185] See e.g., B.M. Barber and T. Odean (2000), "Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors," *Journal of Finance*, 55(2), pp. 773–806; DeLong et al. (1990).

[186] DeLong et al. (1990), pp. 704–705.

[187] DeLong et al. (1990), p. 705.

[188] A large literature has also analyzed how differing investor beliefs about the world or investor disagreement can distort prices. See e.g., E. Ofek and M. Richardson (2003), "DotCom Mania: The Rise and Fall of Internet Stock Prices," *Journal of Finance,* 63(3), pp. 1113–1137 at p. 1113; Hong and Stein (2007).

[189] Allen et al. (2023), pp. 1–4.

111. Specifically, Pedersen (2022) analyzes how the activity of retail traders, coordinated through social media, can lead to distorted stock prices.[190] That study shows that as investment ideas spread among investors who learn via social networks, it is possible for investors to disagree on stock prices: some investors are "stubborn" about their own views, while other investors are rational.[191] The views of stubborn investors influence those of others in the social network, leading to prices that for a certain time period reflect an average of the views of all investors, including the stubborn view, rather than fully reflecting the price based on the underlying information about the stock held by the rational investors. The rational investors, like arbitrageurs, on the other hand, may have limited capital to take advantage of the distorted price in the short term. Thus, facing coordinated trading by less sophisticated investors, arbitrageurs' ability to correct mispricing could be substantially limited in the short term, causing the market to be temporarily inefficient. The study also considers how this excess volatility could be further intensified if it coincides with "forced" trading, as in a short squeeze, which I discuss in **Section VI.D.1** below.[192]

112. In sum, academic studies have documented that constraints on arbitrageurs imposed by "noisy" retail traders can inhibit competitive trading activity among investors and lead to departures from market efficiency for a temporary period. Thus, securities for which arbitrage is risky or constrained—for example, because of risks posed by "destabilizing speculation" by individual investors' potential coordinated trading—can exhibit characteristics inconsistent with trading in efficient markets.

2. Evidence of Retail Investor Coordination

113. As discussed in **Section V.B** above, the large price movements of the At-Issue Stocks in late January and early February 2021 occurred in the context of a broader episode where several dozen stocks experienced large price movements and/or increased trading volume far exceeding movements in the broader stock market. These stocks, widely referred to as "meme stocks,"[193]

[190] L. H. Pedersen (2022), "Game On: Social networks and markets," *Journal of Financial Economics*, 146(3), pp. 1097–1119 ("Pedersen (2022)") at pp. 1112–1113.
[191] Pedersen (2022), p. 1098.
[192] Pedersen (2022), p. 1113.
[193] SEC Report, p. 2. See also "10 highly shorted stocks are soaring as Reddit traders wage war against top Wall Street hedge funds," *Business Insider*, January 27, 2021.

were also being frequently discussed on social media at the time, including on the Reddit forum WallStreetBets and on YouTube channels and other social media.[194] As explained below, academic studies, analysts, other observers, and Plaintiffs comment on the existence of coordinated trading by investors during this period, and discuss the potential impact of such coordinated trading on the prices of the At-Issue Stocks leading up to and during the proposed Class Period.

114. Academic studies have also documented the high correlation between social media mentions and market trading activity and price movements in meme stocks. Allen et al. (2023) observes that the January 2021 episode was "fueled by retail investors and social media platforms," and that "increased coverage of these stocks on social media platforms contributed to increased retail trading."[195] The study documents "the evolution of average daily retail volume and average social media activity" for 13 different stocks (including the nine At-Issue Stocks),[196] and finds evidence of a "strong association between social media activity and retail trading activity … during the short-squeeze period," which Allen et al. (2023) defines as lasting from January 26, 2021 through February 4, 2021.[197]

115. Analysis conducted by studies such as Pedersen (2022), which I have discussed above, of coordinated social media activity affecting prices is particularly applicable to the case of meme stocks.[198] Pedersen (2022) uses a case study of GameStop's stock.[199] The study points to examples of "stubborn" investor views about GameStop spreading through social media in the form of the "diamond hands" and "rocket" memes, which respectively "signaled [investors'] stubborn commitment to buying and holding the stock … and signaled an extreme view of the potential valuation."[200] The article documents that "spikes in trading volume and volatility also coincided with an increase in social media interest in GameStop."[201] The study notes that a

[194] See e.g., SEC Report, p. 18.
[195] Allen et al. (2023), Abstract; p. 2.
[196] Allen et al. (2023), Figure 4; Appendix A.7.
[197] Allen et al. (2023), pp. 14, 25–26. Allen et al. (2023) defines the "short squeeze period" based on findings that, over this window, "the majority of the 13 stocks experienced sharp price increases on January 26," "the majority of the 13 stocks also experienced sharp decreases in short interest on January 26," "the 13 stocks experienced a substantial increase in social media activity starting on January 26," and that "the price and social media activity saw similarly substantial declines across the 13 stocks" on February 4, 2021 (Allen et al. (2023), p. 14).
[198] SEC Report, October 14, 2021, p. 2.
[199] Pedersen (2022), pp. 1109–1112.
[200] Pedersen (2022), p. 1099.
[201] Pedersen (2022), p. 1111.

"short squeeze likely played a role in the price spike in January," but subsequent price movement in early February 2021 "suggest[s] an importance of social network effects."[202] Figure 4 from the article, reproduced below, compares GameStop's stock price, GameStop's volatility, GameStop's turnover, and Google search trends for GameStop, GME, and WallStreetBets, and shows that these measures spiked concurrently during this period:

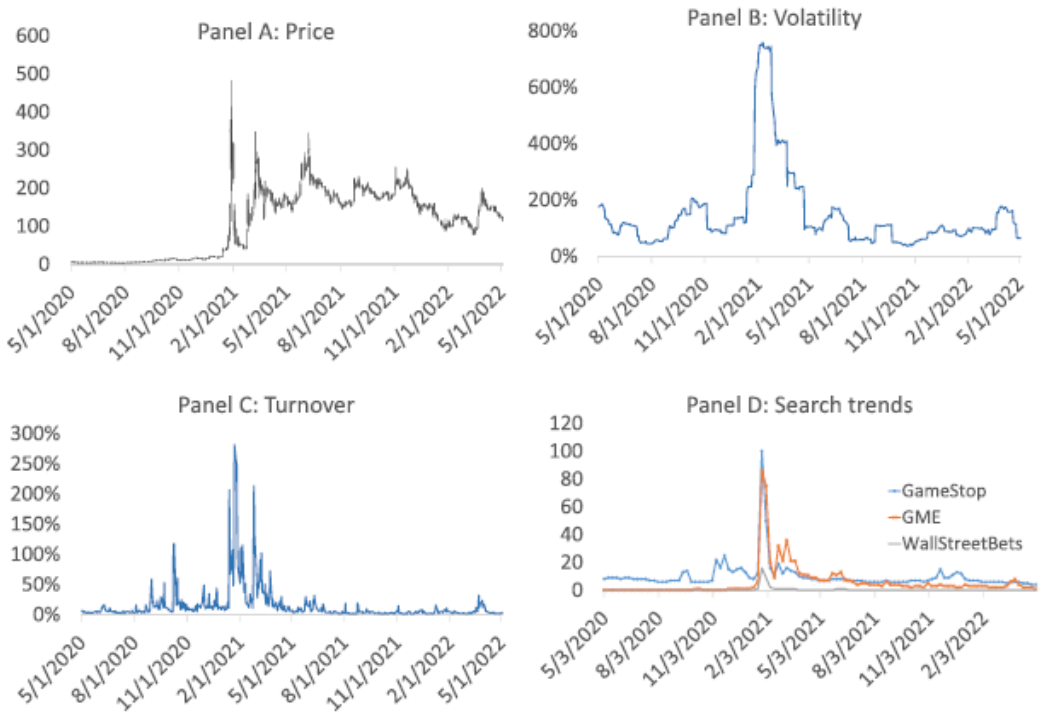
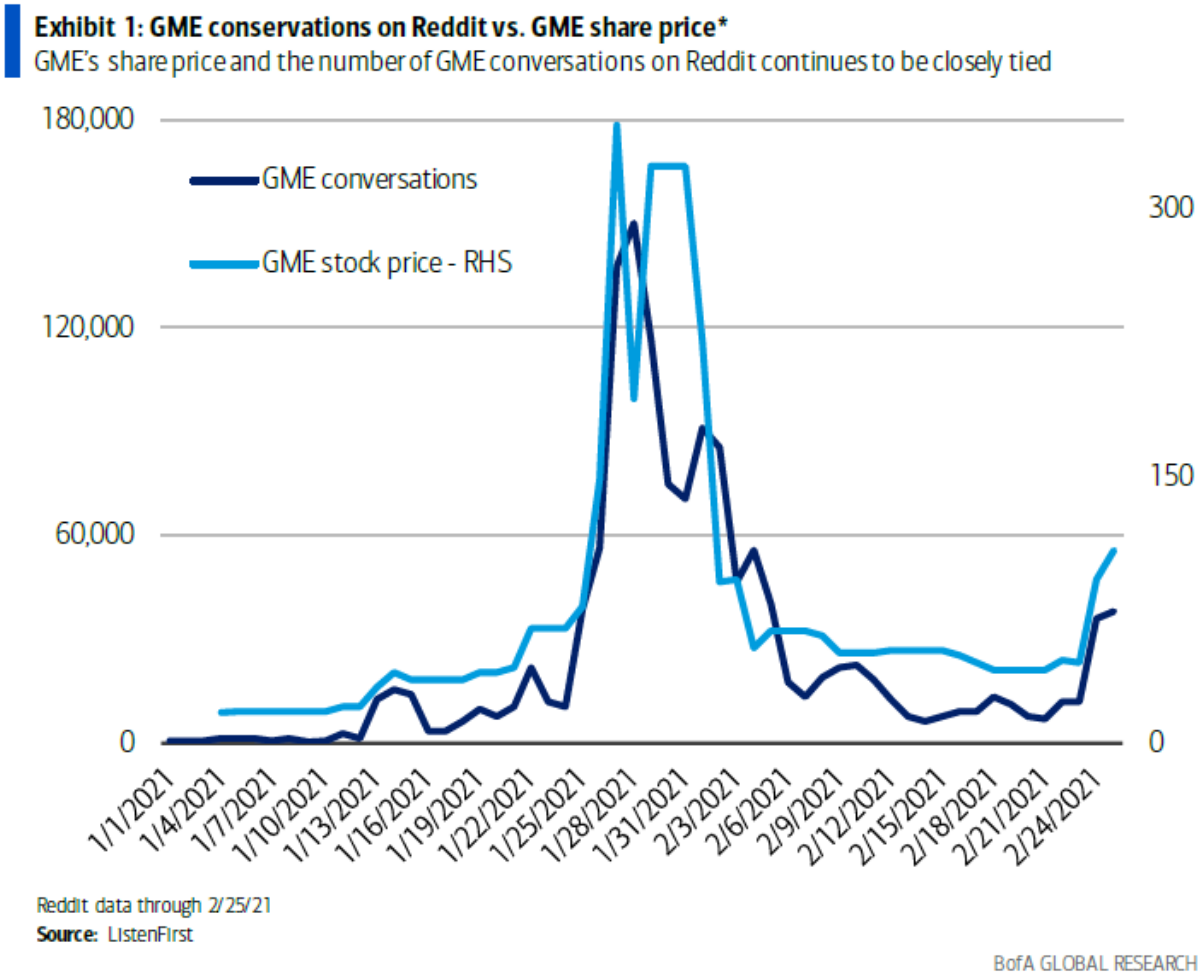


Fig. 4. GameStop price, volatility, turnover, and interest, 5/1/2020-5/3/2022. Panel A shows the GameStop stock price over time (open-high-low-close). Panel B shows the realized volatility (20-day annualized volatility). Panel C shows the daily turnover, and Panel D shows the social media interest as proxied by Google search trends for GameStop, GME, and WallStreetBets.

116. In addition to academic studies published after the fact, contemporaneous analyst reports issued around the proposed Class Period also analyzed the relationship between social media mentions and prices of different At-Issue Stocks. A BofA Securities report issued on February 4, 2021 noted that "[o]ver the past two weeks, there has been an unprecedented increase in the amount of retail interest in GME through online forums such as Reddit, and trading through platforms like Robinhood."[203] The report documented the relationship between the number of Reddit conversations related to GameStop and the company's share price, noting that the two "appear[ed] to be closely tied" in the week prior to and during the proposed Class Period, with

[202] Pedersen (2022), p. 1111.
[203] "When fundamental still appear on the sidelines, what other factors matter," *BofA Securities*, February 4, 2021.

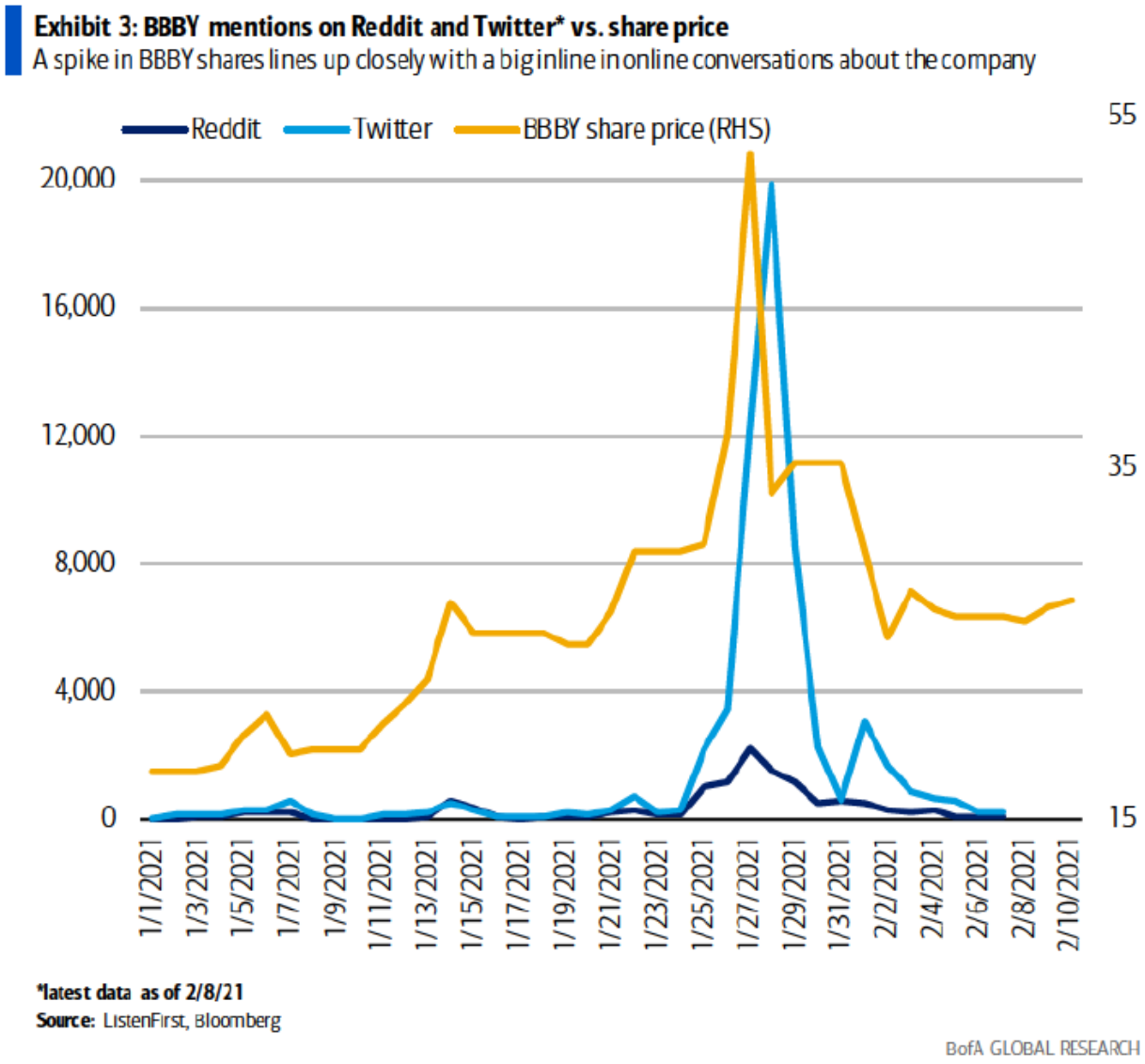
levels of social media interest increasing at the same time that the price run-up occurred, while "reversing along with GME's share price."[204] Exhibit 1 from the analyst report, reproduced below, plots GameStop's share price and Reddit conversations:



As retail interest spread from GameStop to other stocks, a follow-up BofA Securities report from February 11, 2021 noted that "[r]etail interest in GME drew attention to other squeeze stocks" including BlackBerry, Nokia, AMC, and others,[205] and the analyst documented a similar pattern between Bed Bath & Beyond mentions on both Reddit and Twitter and the company's share price, noting that a "spike [in] BBBY shares lines up closely with a big [increase] in online

[204] "When fundamental still appear on the sidelines, what other factors matter," *BofA Securities*, February 4, 2021; "Yet another surge in shares," *BofA Securities*, February 26, 2021.
[205] "The New Retail Investor Speaks Both Stocks and Emoji … on Social," *BofA Securities*, February 11, 2021.

conversations about the company" and commented that as the price fell subsequently, the "[n]on-fundamental factors including short interest, daily volumes and Twitter/Reddit conversations that we believe drove the share spike have all fallen significantly."[206] Exhibit 3 from the analyst report, reproduced below, plots Bed Bath & Beyond's share price and Reddit/Twitter conversations:



117. Other analysts also commented on the impact of retail investors on the group of meme stocks. Select commentary is presented below, and in **Exhibit 10**.

[206] "Remain positive on turnaround and upgrade to Buy on share pull back," *BofA Securities*, February 11, 2021.

Although we are cautious nearer-term on shares of Express, given the recent squeeze play coupled with an investor stampede rocketing shares higher, we maintain our NEUTRAL-rating on Express shares.[207] (Wedbush, January 25, 2021)

Retail investors driving shares: … this retail interest may continue to drive heightened volatility in AMC's shares near term.[208] (Credit Suisse, January 26, 2021)

The sudden, sharp surge in Bed Bath & Beyond's share price and valuation likely has been fueled by a short squeeze, given the high short interest (over 60%), and speculation by retail investors, fueled in chat rooms, much like GameStop.[209] (Telsey Advisory Group, January 28, 2021)

Market Moves Fuel Shares. The recent surge in the value of BlackBerry's shares appears to be driven by retail investors focused on a handful of stocks using a combination of purchasing near-dated call options and the underlying security.[210] (Scotiabank, January 27, 2021)

[D]ay traders have been reportedly aggressively buying the securities of several out-of-favor and heavily shorted US companies including AAL, AMC, BB, BBY, CTRM, EXPR, GME, KOSS, NAKD, NOK, SNDL, TR and TRVG. This caused the underlying stock prices to increase rapidly which then in turn encouraged more buying from both retail investors and short covering from institutional investors. … One trigger for the buying activity was retail investing websites including Reddit's WallStreetBets, which allows retail investors to communicate on investing topics.[211] (Credit Suisse, February 1, 2021)

Nokia was one of the stocks affected by the recent wave of Reddit trade ideas (recommending buying heavily shorted names), alongside GameStop, AMC Entertainment and Blackberry. This explains the significant Nokia share price volatility since 26/01. However, after the correction of recent sessions, we think most of the excess buying pressure on Nokia shares has now been absorbed.[212] (Societe Generale, February 3, 2021)

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[207] "Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush*, January 25, 2021.
[208] "AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021.
[209] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.
[210] "Lowering Recommendation on Significant Market Move," *Scotiabank*, January 27, 2021.
[211] "US Online Brokers," *Credit Suisse*, February 1, 2021.
[212] "Nokia," *Societe Generale*, February 3, 2021.

> We started tracking Reddit considering the impact retail investors had on the overall market in the past few weeks, as seen from the large price movements of GME, AMC, and silver. … We noticed that the top two (GME and AMC) are experiencing a decline in the number of discussions.[213] (Fundamental Research Corp, February 8, 2021)

> NOK ADRs were briefly caught in the day-trader frenzy on the WallStreetBets sub-Reddit, which propelled the ADRs nearly to $7 in January. Reflecting diminished prospects, NOK has slipped back to the $4 area.[214] (Argus, February 12, 2021)

> Over the past two months and in collaboration with BofA's predicative analytics team, we have analyzed the impact on GME shares from non-fundamental factors including the number of conversations on Reddit relating to GME and stimulus, trading vols and short interest. All these factors have shown a tight relationship and large increases have corresponded to several big surges in GME's share price. Recently these factors have all declined significantly from record levels as have GME share price.[215] (BofA Securities, March 24, 2021)

118. The story of retail investor coordination driving the prices of the meme stocks was also widely discussed in the press. Select commentary is presented below, and in **Exhibit 11**.

> A Barron's article noted that GameStop "had been the most-discussed name on the social media site Reddit." Quoting a Telsey Advisory Group analyst, the article noted that "similar excitement from that crowd appears to be moving Stitch Fix (SFIX) and Bed Bath & Beyond (BBBY) stock. Both swung wildly on Monday [January 25]. Other stocks mentioned prominently on the WallStreetBets forum on Reddit include AMC Entertainment Holdings (AMC), Blackberry (BB), Express (EXPR), And Nokia (NOK). The all posted double-digit gains on Monday [January 25]."[216] (Barron's Online, January 25, 2021)

> Frenzied buying also drove GameStop shares up as much as 160%, BlackBerry up 31%, and Bed Bath & Beyond up 46%. The four companies gained a combined $29 billion in market capitalization at their peak stock prices. Amateur investors have gathered, most notably on the Reddit forum r/wallstreetbets, to pinpoint stocks they can buy en masse with the hope of scoring fast profits. They frequently target stocks that are popular shorts, as driving their stock prices up can

[213] "Introducing Reddit Sentiment Tracker," *Fundamental Research Corp*, February 8, 2021.
[214] "Analyst's Notes," *Argus*, February 12, 2021.
[215] "4Q op. earning disappoint in big way so what's the GME plan from here? Reit U/p," *BofA Securities*, March 24, 2021.
[216] "GameStop Stock Surges, Plunges, and Ends at Record Close," *Barron's Online*, January 25, 2021.

pressure short-sellers into buying shares back to cover their positions, which sends prices even higher.[217] (Business Insider, January 27, 2021)

GameStop, BlackBerry and Nokia were among the most heavily traded U.S. stocks before the bell, with analysts putting the moves partly down to herds of amateur investors chasing tips from Reddit discussion threads or the private Facebook group "Robin Hood's Stock Market Watchlist."[218] (Reuters, January 27, 2021)

The financial turmoil was caused by the organized buying of companies including videogame retailer GameStop, software company BlackBerry (BB) and movie-theater chain AMC Entertainment (AMC), all of which have had troubled financial performance that had led many institutional players to short their stocks.[219] (Barron's Online, January 28, 2021)

Chico's, Tootsie Roll Join The GameStop Flash Rally … Other stocks appeared to have made their way onto the flash-mob radar early Thursday [January 28]. Candymaker Tootsie Roll Industries eased to an 8% gain, after an early spike. Tootsie Roll vaulted 55% in early trade Wednesday [January 27], then narrowed its advance to 11%.[220] (Investor's Business Daily, January 28, 2021)

Meanwhile, short squeeze stocks like GameStop and AMC Entertainment continued higher. Shares of GameStop gained as much as 70% Friday [January 29] after closing down 44% the day prior while AMC was up 54%. Both stocks have been swinging wildly this week due to coordinated trading by retail investors using the WallStreetBets Reddit chat room.[221] (Investor's Business Daily, January 29, 2021)

The Reddit rally, meanwhile, continues to unravel Tuesday [February 2]. … "The GameStop nonsense seems to be abating as the fever around that cohort of stocks starts to break," Vital Knowledge Media Founder Adam Crisafulli says, noting that GameStop's short interest has declined precipitously.[222] (Forbes, February 2, 2021)

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[217] "AMC spikes 420% as day traders ignite shorted stocks like GameStop, BlackBerry, and Bed Bath & Beyond," *Business Insider*, January 27, 2021.
[218] "GameStop stock doubles again with no let-up in amateur interest," *Reuters*, January 27, 2021.
[219] "Stocks Close Higher, Bouncing Back From Big Losses," *Barron's Online*, January 28, 2021.
[220] "Dow Jones Today Leads Stocks Higher After Jobs, GDP Data; Apple, Tesla Earnings; New Stocks Join GameStop Flash Rally," *Investor's Business Daily*, January 28, 2021.
[221] "Dow Jones Down 575 Points; GameStop, AMC Soar; This Financial Stock Breaks Out," *Investor's Business Daily*, January 29, 2021.
[222] "Reddit-Fueled Meme Stocks Are Tanking Again–GameStop Losses Near $14 Billion While Dow Jumps Another 250 Points," *Forbes*, February 2, 2021.

> After plunging 60% Tuesday [February 2] and Wednesday [February 3], shares of GameStop are plunging an additional 30% Thursday [February 4] (as of 11:30 a.m.), wiping out nearly two weeks of monster gains and pushing the firm's market capitalization down to $4.5 billion from a closing peak last Wednesday of $24.3 billion. The losses are piling on after Bank of America analyst Curtis Nagle said in a Thursday [February 4] note to clients that dwindling online conversation, short interest and daily trading volume in GameStop shares should contribute to prices reverting back toward levels backed by fundamentals.[223] (Forbes, February 4, 2021)

119. Finally, the impact of coordinated trading documented by academics, analysts, and news sources is consistent with Plaintiffs' allegations. Plaintiffs assert that trading by retail investors drove up prices in GameStop and spread to other At-Issue Stocks.[224] In particular, Plaintiffs state that "[t]he rise in meme stock prices occurred in mid- to late-January 2021 because posters on social media investment sites had noted that some hedge funds had taken large short interests in certain of the Affected Stocks."[225]

120. Events on January 27, 2021 serve as a helpful case study that illustrates the potential impact of this widely documented investor coordination, and the implications for market efficiency. In particular, public press reported that late in the day on January 27, 2021, the WallStreetBets Reddit page was taken private. It was reported that "sometime around 6:40pm," the WallStreetBets forum was set to private, "limiting public visibility and commenting abilities for existing and new posts," before being "back up around 7:36pm."[226] The WallStreetBets forum going private would make it harder for investors to use that platform to coordinate. Public press also noted that in response to this event, some of the stocks most prominently discussed on the site saw large price declines in aftermarket trading, with the "most-discussed stocks [falling]

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[223] "Meme Stocks Crash Again: GameStop Losses Hit $20 Billion In One Week As Reddit-Fueled Mania Subsides," *Forbes*, February 4, 2021.

[224] "Retail investors and savvy hedge funds responded by driving up the price of the stock: after closing at $43.03 that day, GameStop's price soared to $65.01 at the close of the markets on January 22, 2021" (Complaint, ¶ 41); "After noticing the contest between hedge funds and other investors, retail investors rallied against the hedge funds. (Complaint, ¶¶ 40–41). Using a sub-Reddit thread called WallStreetBets as a collective action platform, retail investors purchased millions of shares of GME, sending the stock price soaring" (Motion to Dismiss Order, p. 5, internal citations omitted).

[225] Complaint, ¶ 40.

[226] "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica*, January 28, 2021. The article added: "As far as the group's most famous project, GameStop stock dropped precipitously in after-hours trading immediately following the move to take WSB private, going from $316 per share at 6:45 to under $250 per share by 7pm. The stock bounced back to a price of $291 in the hour following that dip, still significantly below the closing price of $341 at 4pm. Stock in cinema chain AMC saw a similar price dip and rally around the same times."

by as much as a third before the page returned to its previous status and share prices rebounded."[227]

121. In **Exhibit 12**, I present the intraday price movements of the nine At-Issue Stocks on January 27 and 28, 2021. As shown, for all nine stocks, the stock prices declined in the aftermarket period on January 27, 2021, before rebounding at the approximate time when WallStreetBets was reopened to the public. An investor forum temporarily going private and subsequently becoming public again would not convey new, value-relevant information regarding the nine At-Issue Stocks. To the extent that the stock prices of the nine at-issue companies did indeed fall in response to the WallStreetBets forum being temporarily taken private, limiting how certain retail investors could communicate with others, that is hard to reconcile with the notion of market efficiency. Additionally, if the stock prices rebounded due to the page being made public again, this would also be at odds with the notion of market efficiency, and, at the same time, consistent with the stock price being impacted by investor coordination.

D. Analysts, Academic Studies, Other Observers, and Plaintiffs Also Attributed the Price Movements to Short Squeezes, Attempted Short Squeezes, or Short-Sale Constraints, Which Are Inconsistent with or Can Impede Market Efficiency

122. Analysts, academic studies, other observers, and Plaintiffs also attributed the price movements leading up to and during the proposed Class Period to short squeezes, attempted short squeezes, or short-sale constraints for the At-Issue Stocks, which would also be inconsistent with or can impede market efficiency. Below, I first discuss the academic literature on short-sale constraints and short squeezes, and their implications for market efficiency. I then document that analysts, academic articles, other observers, and Plaintiffs discuss potential short squeezes or attempted short squeezes for the At-Issue Stocks and the impact of the potential

[227] "Volatility continued in overnight trading when the moderators of Wallstreetbets briefly blocked nonsubscribers from accessing the page. This cause[d] some of its most-discussed stocks to fall by as much as a third before the page returned to its previous status and share prices rebounded" ("Hedge funds retreat in face of day-trader onslaught," *Financial Times*, January 28, 2021). "The after-hours slide for both stocks, however, came after r/WallStreetBets became a private page later that day. A message on the page cited 'technical difficulties' due to a surge in interest and potential difficulties in moderating the forum. Nonetheless, later in the evening, the site was accessible. Either way, after spiking during regular trading hours, AMC stock fell 27% after hours. GameStop stock lost 16%" ("AMC Stock Tops GameStop's Surge Amid Reddit-Hedge Fund Game Of Chicken," *Investor's Business Daily*, January 28, 2021).

short squeezes on prices leading up to and during the proposed Class Period. Finally, I present empirical evidence from the share lending market that is consistent with constraints to short selling for certain At-Issue Stocks. The existence of short squeezes or short-sale constraints that contributed to the unusual price movements of the At-Issue Stocks during the Relevant Period would be inconsistent with or can impede market efficiency.

1. Short-Sale Constraints, Short Squeezes, and Market Efficiency

123. Academic research stresses the importance of the ability of market participants to short sell in order for stock prices to quickly and fully incorporate public information. Short selling is a way to profit from declines in stock prices and involves selling a stock that an investor does not own.[228] In order to sell a stock short, an investor must first borrow the stock from a lender in an equity lending market.[229] In order to borrow the stock, the investor must pay a borrowing fee.[230] Once the stock has been borrowed, it is sold on the market. To close out the position, the short seller needs to repurchase the stock in order to return the stock to the lender.[231] If the stock is repurchased at a higher price than it was originally sold, the short seller has lost money on the transaction.[232] As I discuss below, constraints on the ability to sell a stock short can impede market efficiency.[233]

124. An arbitrageur attempting to take advantage of mispricing in a stock through a short position faces a number of risks, even if the stock is actually overvalued. One salient risk, as mentioned in **Section VI.A** above, is that the stock price will keep increasing (i.e., that the mispricing gets worse) after the short-sale position has been put in place, which could lead to the short seller, who is often a professional asset manager, facing a margin call.[234] In a margin call, a short seller whose position has lost value is required to provide additional money in order to

[228] Brealey et al. (2011), p. 327.
[229] Brealey et al. (2011), p. 327.
[230] Brealey et al. (2011), p. 327.
[231] Brealey et al. (2011), p. 327.
[232] Brealey et al. (2011), p. 327.
[233] See e.g., J.E. Engelberg, A.V. Reed, and M.C. Ringgenberg (2018), "Short-Selling Risk," *Journal of Finance*, 73(2), pp. 755–786 ("Engelberg et al. (2018)") at pp. 755–756; D'Avolio (2002), p. 274.
[234] Brealey et al. (2011), pp. 327–328; Engelberg et al. (2018), p. 755; "Margin: Borrowing Money to Pay for Stocks," *U.S. Securities and Exchange Commission*, April 17, 2009, available at https://www.sec.gov/about/reports-publications/investor-publications/margin-borrowing-money-pay-stocks.

maintain the position.[235] If the short seller does not have sufficient funds available, they may be forced to close out the short position at a loss.[236] Even if they have sufficient funds in the short term, sustained losses in the position may lead to capital withdrawal, so they will be unable to maintain the position in the long run.[237]

125. In addition to the risk that the stock price rises, short sellers face other risks such as the risk that the stock loan will be recalled, or that the rate on the stock loan increases.[238] When a stock loan is recalled, which the lender can typically choose to do at any time, the short seller must borrow the stock from another lender, possibly with higher borrowing costs, or must close the position at the prevailing market price, potentially at a loss.[239] Similarly, if the borrowing rate is increased such that the short position is no longer economical, that can force the borrower to close the position.[240]

126. These risks can act as constraints on short selling. Uncertainty about future risks of short selling can also act as constraints.[241] There are also direct constraints that can limit short selling. For example, in some instances, short selling is possible but expensive, while in other instances short selling has been banned altogether for certain assets.[242] One form of short-sale constraints occurs when shares are difficult and expensive to borrow, which can occur when the supply of shares available to borrow is small. As documented in empirical academic research into stock borrowing costs, fees for borrowing stock are generally low, but they can be extremely high for some stocks at certain periods of time.[243] In particular, when most available shares have been lent out, additional shares are increasingly more difficult and costly to borrow.[244]

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[235] Engelberg et al. (2018), p. 755; "Margin: Borrowing Money to Pay for Stocks," *U.S. Securities and Exchange Commission*, April 17, 2009, available at https://www.sec.gov/about/reports-publications/investor-publications/margin-borrowing-money-pay-stocks.
[236] Engelberg et al. (2018), p. 755; "Margin: Borrowing Money to Pay for Stocks," *U.S. Securities and Exchange Commission*, April 17, 2009, available at https://www.sec.gov/about/reports-publications/investor-publications/margin-borrowing-money-pay-stocks.
[237] Shleifer and Vishny (1997), pp. 36–37.
[238] Engelberg et al. (2018), p. 755.
[239] Engelberg et al. (2018), p. 755; D'Avolio (2002), pp. 276–277.
[240] Engelberg et al. (2018), pp. 755–756.
[241] Engelberg et al. (2018), p. 756.
[242] See e.g., "SEC Halts Short Selling of Financial Stocks to Protect Investors and Markets," *U.S. Securities and Exchange Commission*, September 19, 2008, available at https://www.sec.gov/news/press/2008/2008-211.htm.
[243] See e.g., Engelberg et al. (2018), pp. 761–762; D. Muravyev, N. D. Pearson, and J. M. Pollet (2022), "Is There a Risk Premium in the Stock Lending Market? Evidence from Equity Options," *Journal of Finance*, 77(3), pp. 1787–1828 ("Muravyev et al. (2022)") at p. 1802.
[244] A.C. Kolasinski, A.V. Reed, and M.C. Ringgenberg (2013), "A Multiple Lender Approach to Understanding Supply and Search in the Equity Lending Market," *Journal of Finance*, 68(2), pp. 559–595 at pp. 578, 585.

127. Academic research has shown that short-sale constraints, such as those described above, can impede market efficiency.[245] A particularly famous example involves an equity carve-out, in which 3Com sold a fraction of its ownership in Palm but retained 95% of Palm's equity, which it planned to distribute to its own shareholders by giving them 1.5 shares of Palm for every share of 3Com they owned.[246] This arrangement implied that 3Com's share price should have been, at least, 1.5 times the share price of Palm because each 3Com share would receive the value of 1.5 Palm shares. However, Palm's stock closed at $95.06 following its IPO, while 3Com closed at $81.81—"[i]n other words, the stock market was saying that the value of 3Com's non-Palm business was -$22 billion."[247] Yet it was not possible for arbitrageurs to correct this mispricing through trading due to high stock borrowing costs.[248] In other words, academic studies have documented evidence that prices can fail to reflect value-relevant information when there are short-sale constraints.[249]

128. A "short squeeze" is a situation where short sellers are forced to close out their positions due to the risk and constraints they face.[250] When a short squeeze develops in a market, one can usually observe prices increasing sharply in the absence of new, value-relevant information.[251] The sudden increase in price may or may not be due to deliberate actions by certain market participants, although some short squeezes can be the result of potentially deliberate intent on the part of some traders to trigger such a price increase.[252] The sudden increase in prices can have the effect of forcing a large number of short sellers to cover their positions by purchasing the stock. The necessity to cover could result from margin calls or other constraints on investor capital that may prevent short sellers from absorbing further losses on their short position. As the short sellers rush to cover their positions and buy the stock, this may lead to additional upward pressure on stock prices, which could result in a feedback effect.[253] Short squeezes often

[245] See e.g., D'Avolio (2002), p. 274; Engelberg et al. (2018), pp. 755–756.
[246] See e.g., O.A. Lamont and R.H. Thaler (2003), "Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs," *Journal of Political Economy*, 111(2), pp. 227–268 ("Lamont and Thaler (2003)") at p. 230.
[247] Lamont and Thaler (2003), p. 230.
[248] Lamont and Thaler (2003), pp. 230–231.
[249] See e.g., Lamont and Thaler (2003), p. 231; O.A. Lamont and R.H. Thaler (2003), "Anomalies: The Law of One Price in Financial Markets," *Journal of Economic Perspectives* 17(4), pp. 191–202.
[250] D'Avolio (2002), pp. 279–280.
[251] Allen et al. (2021), p. 167; Brealey et al. (2011), p. 327.
[252] "Key Points About Regulation SHO," *U.S. Securities and Exchange Commission*, May 31, 2022, available at https://www.sec.gov/investor/pubs/regsho.htm.
[253] Allen et al. (2021), p. 167.

occur in stocks with a very high level of short interest (i.e., a high proportion of available shares being sold short, which means fewer shares available to borrow), which then declines after the squeeze.[254]

129. Ordinarily, in such circumstances, arbitrageurs would enter the market and correct the temporary mispricing by selling the shares short and driving down the price. However, when short sellers have been forced to exit their positions, for example, due to constraints on capital or the inability to sustain further losses due to the risk of capital withdrawal,[255] this may not be possible. As a result, prices can remain at temporarily irrational levels because short sellers are unable to trade to correct the mispricing. To the extent that short sellers are unable to enter the market to counteract the buying pressure from covering other short positions, a "short squeeze" can prevent information from being fully and rapidly incorporated into stock prices.

130. Short squeezes can form in markets without deliberate activity on the part of investors, but they can also be the result of intentional activity by certain traders.[256] Through coordinated trading that takes advantage of particular market situations, prices can also be deliberately moved away from levels that reflect value-relevant information. For example, a study of "predatory trading" finds that some market participants can act to take advantage of another trader's need to sell a large position by selling alongside so as to profit from the price decline (an analogous situation could occur when a large trader needs to buy a large position, for example, to cover a large short position in a stock, and other traders also buy alongside).[257] The study posits that this type of "forced" trading could push large traders (e.g., short sellers) into financial difficulty (i.e., they are squeezed out) and could amplify the price distortion observed initially.[258]

131. In addition to a short squeeze in the market for the stock, activity in equity option markets[259] can contribute to stock price increases not associated with new, value-relevant

[254] Allen et al. (2021), p. 167.
[255] Shleifer and Vishny (1997), pp. 36–37.
[256] "Key Points About Regulation SHO," *U.S. Securities and Exchange Commission*, May 31, 2022, available at https://www.sec.gov/investor/pubs/regsho.htm.
[257] Brunnermeier and Pedersen (2005).
[258] Brunnermeier and Pedersen (2005). Another example of manipulative activity is a "pump and dump" scheme, in which a trader who already owns a security attempts to persuade other investors to buy the security, for example, via social media, pushing up the price in the process, in the hopes of later selling the security at a profit ("Pump and Dump Schemes," *Investor.gov*, available at https://www.investor.gov/introduction-investing/investing-basics/glossary/pump-and-dump-schemes).
[259] Equity options are derivative securities that allow the purchasers of the option to buy or sell a stock at a predetermined price by a certain date (J.C. Hull (2015), Options Futures, and Other Derivatives, 9th ed., Upper Saddle River, NJ: Pearson Education, Inc. ("Hull (2015)"), pp. 8–9).

information. This is because option market makers, who provide liquidity in option markets, often use the underlying stock to hedge their option positions.[260] Thus, activity in option markets can lead to trading in the underlying stock for hedging purposes, which can in turn impact option prices, creating a feedback loop. In particular, the notion of "gamma squeeze" means that a surge in investor demand for long call option positions could push option prices to increase at a high rate, which in turn would force market makers (i.e., those who facilitate customer trading by writing the call options and buying underlying stocks to hedge) to buy additional shares to hedge their positions, further driving up stock prices.[261]

132. In sum, risks and constraints on arbitrageurs' ability to sell stocks short—whether due to sharply rising stock prices, high costs, or limited supply for borrowing stocks, or risks due to the possibility of loan recall or changes in the borrow rate—can present impediments to trading that inhibit the incorporation of new, value-relevant information into stocks. These constraints can lead to short squeezes, in which there is usually an existing large short interest and short sellers are forced out of their short positions by rising prices, which is inconsistent with market efficiency.

2. Analysts, Academic Studies, Other Observers, and Plaintiffs Attributed the Price Movements to Short Squeezes or Attempted Short Squeezes

133. The retail coordination discussed in **Section VI.C.2** above was often framed by market commentators as a battle between Reddit users and short sellers, with retail investors coordinating to target companies with high short interest to try to force short squeezes.[262] As explained below, analysts, academic studies, other observers, and Plaintiffs point to potential short squeezes or attempted short squeezes for the At-Issue Stocks and their impact on stock prices leading up to and during the proposed Class Period.

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[260] Hull (2015), pp. 402–403.

[261] In options trading, "delta" refers to the size of the impact on the option price of a small change in the underlying stock price. "Gamma" is the size of the impact on the option delta of a small change in the underlying stock price (Hull (2015), pp. 285, 408, 411). In a "gamma squeeze," a positive gamma, which can be associated with a long position in a call option, increases the need for additional share purchases to hedge the underlying position when the underlying stock price increases (Pedersen (2022), p. 1111).

[262] See e.g., "Smaller investors face down hedge funds, as GameStop soars," *Associated Press Newswires*, January 25, 2021. The *Wall Street Journal* similarly noted that "[t]he videogame retailer has been at the center of a fight between bullish day traders communicating on the internet forum Reddit, and short sellers, who bet heavily against the stock" ("Nasdaq, S&P 500 Finish at Records," *Wall Street Journal*, January 25, 2021).

134. Potential short squeezes or attempted squeezes in the meme stocks (including certain At-Issue Stocks) leading up to and during the proposed Class Period have been studied by academics and by regulators. A recent working paper, Allen et al. (2023), finds that there were short squeezes in five of the nine At-Issue Stocks, including GameStop, AMC, Bed Bath & Beyond, Express, and Tootsie Roll.[263] Allen et al. (2023) define the short-squeeze period as January 26, 2021 through February 4, 2021 and examine whether short squeezes occurred in the nine At-Issue Stocks and four other stocks[264] for which PCO restrictions were put in place on January 28, 2021. The working paper notes the following:

> First, the majority of the 13 stocks experienced sharp price increases on January 26. … Second, the majority of the 13 stocks also experienced sharp decreases in short interest on January 26. … Third, the 13 stocks experienced a substantial increase in social media activity starting on January 26. … The reverse is true for February 4, when the price and social media activity saw similarly substantial declines across the 13 stocks.[265]

Similarly, the SEC Report examining GameStop during the January and early February 2021 period studied a potential short squeeze and concluded that "short sellers covering their positions likely contributed to increases in GME's price" and also directly observed "periods of sharp price increases during which accounts held by firms known to the staff to be covering short interest in GME were actively buying large volumes of GME shares, in some cases accounting for very significant portions of the net buying pressure."[266]

135. In addition to studies published after the fact, contemporaneous analyst reports issued around the proposed Class Period commented on the potential short squeezes in the At-Issue Stocks and noted that high short interest was common among the meme stocks. A Credit Suisse analyst report from February 1, 2021, for example, noted that "several dramatic 'short squeezes' were occurring in parallel" with "aggressive[] buying[] of several out-of-favor and heavily shorted US companies including AAL, AMC, BB, BBY, CTRM, EXPR, GME, KOSS, NAKD,

[263] Allen et al. (2023), Table 1. The working paper does not find evidence of a short squeeze in BlackBerry, Koss, Nokia, or Trivago.
[264] The four other stocks were American Airlines, Castor Maritime, Naked Brand Group, and Sundial Growers (Allen et al. (2023), pp. 1, 19).
[265] Allen et al. (2023), p. 14.
[266] SEC Report, pp. 25–26.

NOK, SNDL, TR, and TRVG."[267] Analysts covering Bed Bath & Beyond, BlackBerry, GameStop, AMC, and Express all noted price patterns consistent with potential short squeezes and/or social media interest in coordinating short squeezes in the stocks.[268] Select commentary is presented below, and in **Exhibit 13**.

> The sudden, sharp surge in GameStop's share price and valuation likely has been fueled by a short squeeze.[269] (Telsey Advisory Group, January 25, 2021)

> We are cautious on shares of Express, after rocketing 150% in the last two trading days on the heels of retails wider squeeze-play with most-shorted stocks up +14% versus least-shorted stocks +4% in the RUA index so far in 2021, coupled with an investor stampede following Will Meade's (Twitter personality and former pm) speculative tweet. Meade's speculation pegs Express as the next GameStop.[270] (Wedbush, January 25, 2021)

> AMC's recent rally (+110% YTD) has been driven by retail investors buying shares in order to trigger a short squeeze.[271] (Credit Suisse, January 26, 2021)

> The sudden, sharp surge in Bed Bath & Beyond's share price and valuation likely has been fueled by a short squeeze, given the high short interest (over 60%), and speculation by retail investors, fueled in chat rooms, much like GameStop.[272] (Telsey Advisory Group, January 28, 2021)

> In our view, one of the major causes (along with very high short interest and trading volumes) for GME's share price increase is increased participation by retail investors which appears to have been exacerbated by social media platforms such as Twitter and Reddit. While still high on a relative or historic basis, GME mentions on Reddit (including on the wallstreetbets forum), short interest, and trading volumes have all declined significantly from recent peaks over the past several days. This has corresponded with a drop in GME's share price which is

[267] "US Online Brokers," *Credit Suisse*, February 1, 2021.
[268] See e.g. "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021; "Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush*, January 25, 2021; "CFRA Maintains Sell Opinion on Shares of GameStop Corp.," *CFRA*, January 15, 2021; "Anticipate gradual software & services recovery and increasing PT to $10, but downgrade to SELL on valuation," *Canaccord Genuity*, February 16, 2021; "CFRA Reduces Opinion on Shares of AMC Entertainment to Sell From Hold," *CFRA*, February 4, 2021.
[269] "GME - Downgrading to Underperform; Disconnect Between Fundamentals and Valuation," *Telsey Advisory Group*, January 25, 2021.
[270] "Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush*, January 25. 2021.
[271] "AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021.
[272] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.

> now $92.41 as of the market close on February 3rd, from an intraday high of $483 on January 28th … A considerable decline in short interest (now about 40% of shares from a peak of 140%) may also provide less potential for short squeezes.[273] (BofA Securities, February 4, 2021)

> Our action [reducing to "sell" from "hold"] is based on valuation, with potential downside to our 12-month target, which we keep at $2.50, noting its extreme volatility in the past week amid indications of a potential short squeeze.[274] (CFRA, February 4, 2021)

> Share price up ~100% in C2021: BlackBerry shares have appreciated ~100% as part of a Reddit driven rally. While the shares are ~50% below the January 27 closing price of $25.10, our analysis leads us to believe the shares are still overvalued. … with the volatility in the shares following recent unusual trading activity from a targeted short squeeze, the share price is above our increased price target, resulting in our downgrade to SELL.[275] (Canaccord, February 16, 2021)

136. Public press also widely documented the coordinated short-squeeze attempts in several of the meme stocks and their impact on stock prices. Select commentary is presented below, and in **Exhibit 14**.

> Scores of retail investors, including some members of Reddit forum r/wallstreetbets, have targeted heavily shorted stocks in recent weeks. They drove GameStop's stock price up as much as 145% on Monday, Bed Bath & Beyond up 58%, BlackBerry up 48%, and AMC up 39%.[276] (Business Insider, January 26, 2021)

> [T]he biggest reason the shares [in GME] have more than doubled in 2021 is the extraordinarily high short interest in the stock. In fact, more than 100% of the shares available for trading (or "the float") had been borrowed by short sellers to bet against the stock as of the end of last year. That short interest remains high… Steve Sosnick, the chief strategist at Interactive Brokers, said in an interview that short sellers should be on alert. "I believe there is a systematic targeting of highly shorted stocks," he said.[277] (Barron's Online, January 27, 2021)

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[273] "When fundamentals still appear on the sidelines, what other factors matter," *BofA Securities*, February 4, 2021.
[274] "CFRA Reduces Opinion on Shares of AMC Entertainment to Sell From Hold," *CFRA*, February 4, 2021.
[275] "Anticipate gradual software & services recovery and increasing PT to $10, but downgrade to SELL on valuation," *Canaccord Genuity*, February 16, 2021.
[276] "The firms of billionaire investors Steve Cohen and Ken Griffin pour $2.8 billion into a GameStop short–seller that's lost 30% this year," *Business Insider*, January 26, 2021.
[277] "Another GameStop? Here Are the Next 10 Most Shorted Small-Caps. -- Barrons.com," *Barron's Online*, January 26, 2021.

A big worry is that this has become a short-squeeze revolt. Short-sellers were down $91 billion for the month through yesterday, according to data from S3. … While much of that was because of the overall rise in stocks, shares in other heavily shorted companies, like the headphone maker Koss, are up big. "I believe there is a systemic targeting of highly shorted stocks," said Steve Sosnick of Interactive Brokers.[278] (New York Times, January 27, 2021)

So far this week, stocks of companies including GameStop (ticker: GME), AMC Entertainment (AMC), Nokia (NOK), Express (EXPR), and American Airlines (AAL) have been swinging wildly, driven in part by individual investors organizing on online message boards. Individuals who successfully traded the swings have reported sizable gains, and the volatility has put pressure on hedge-fund managers who were betting on declines in those stocks with short positions.[279] (Barron's Online, January 29, 2021)

The GameStop saga is likely far from over. GME stock, AMC Entertainment, Koss, Express and other short squeeze plans had another mammoth week of ultra-volatile swings.[280] (Investor's Business Daily, January 30, 2021)

On Thursday [January 28], GME stock plunged 77% in less than 90 minutes from its intraday high to low. In a game of musical chairs, you don't want to be the one left standing. When the squeeze plays finally end, GME stock, AMC stock and others will likely come under enormous pressure.[281] (Investor's Business Daily, January 30, 2021)

One important factor gave way to any bullish sentiment: short squeezes appear, for now, to be dormant. GameStop (GME) and Bed Bath & Beyond (BBBY) fell 31% and 14%, respectively. AMC Entertainment (AMC) stock rose just 1%.[282] (Dow Jones Institutional News, February 1, 2021)

What goes up, must come down, and today gravity seems to be taking its toll on consumer-related stocks caught up in the short-squeeze frenzy. GameStop (ticker: GME) stock is the biggest mover this morning [February 2, 2021], down 49%. AMC Entertainment Holdings (AMC) is tumbling 38.2%, Express (EXPR) is 32% lower, Bed Bath & Beyond (BBBY) is off 14.5%, Stitch Fix (SFIX) is

[278] "Can Anything Stop GameStop?," *New York Times*, January 27, 2021.
[279] "Wall Street Suggests Ways for American Airlines and Others to Cash In on Squeeze. Investors Should Be Wary," *Barron's Online*, January 29, 2021.
[280] "Dow Jones Futures: What's Next For Stock Market Rally — And What Should You Do? GME Stock, Nio In Focus," *Investor's Business Daily*, January 30, 2021.
[281] "Dow Jones Futures: What's Next For Stock Market Rally — And What Should You Do? GME Stock, Nio In Focus," *Investor's Business Daily*, January 30, 2021.
[282] "The Dow Rose 229 Points Because Everything Went Right for Stocks -- Barrons.com," *Dow Jones Institutional News*, February 1, 2021.

> 5.5% lower, and Macy's (M) is down 3.6%.[283] (Barron's Online, February 2, 2021)
>
> GameStop, AMC Entertainment and other heavily shorted stocks targeted in a Reddit online forum continued to have huge volume as the short-squeeze trade appears to unwind. [On February 2] GameStop shares plummeted 60% in 76.4 million shares traded, while AMC plunged 41% in 455 million shares.[284] (Investor's Business Daily, February 2, 2021)

137. Additionally, following the January 2021 episode, GameStop, AMC, Express, and Koss all publicly commented on the ongoing and future risk of coordinated short squeezes in their stocks.[285]

138. Koss, for example, stated directly that a short squeeze had occurred in its stock. In its Form 10-Q dated May 13, 2021, Koss stated:

> Recently, securities of certain companies have experienced significant and extreme volatility in stock price due to a sudden increase in demand for stock resulting in aggregate short positions in the stock exceeding the number of shares available for purchase, forcing investors with short exposure to pay a premium to repurchase shares for delivery to share lenders. This is known as a "short squeeze." These short squeezes have led to the price per share of those companies to trade at a significantly inflated rate that is disconnected from the underlying value of the company. A large proportion of our common stock has been and may continue to be traded by short sellers which may increase the likelihood that our common stock will be the target of a short squeeze. **A short squeeze has led and could continue to lead to volatile price movements in shares of our common stock that are unrelated or disproportionate to our operating performance or prospects** and, once investors purchase the shares of our common stock necessary to cover their short positions, the price of our common stock may rapidly decline.[286] (emphasis added)

139. Finally, the evidence above of short squeezes or potential short squeezes in the At-Issue Stocks is consistent with Plaintiffs' allegations. As discussed above, Plaintiffs assert that there was an "alleged short squeeze" in the affected stocks directly prior to the proposed Class

[283] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.
[284] "Stocks Extend Rebound As Market Risk Suddenly Eases; 3 Reasons For Caution," *Investor's Business Daily*, February 2, 2021.
[285] See Koss Corporation, Form 10-Q for Q3 2020, filed May 13, 2021, p. 17; AMC Entertainment Holdings, Inc., Form 10-K for FY 2020, filed March 12, 2021, pp. 35–36; GameStop Form 10-K for FY 2020, filed March 23, 2021, p. 15; Express Inc. Form 10-K for FY 2020, filed March 25, 2021, p. 26.
[286] Koss Corporation, Form 10-Q for Q3 2020, filed May 13, 2021, p. 25.

Period.[287] Plaintiffs also describe the run-up in price as the result of an "online battle" between short sellers and retail investors over GameStop, through which "[r]etail investors and savvy hedge funds responded by driving up the price of the stock" and "GameStop's share price began to soar as a result of this public feud."[288]

3. Empirical Evidence of Short-Sale Constraints

140. In addition to short-sale constraints being widely discussed by market participants and academics, in this section I discuss empirical evidence of constraints that may have inhibited the ability of arbitrageurs and other market participants to short certain of the At-Issue Stocks. I present empirical data available to me from the share lending market on borrowing costs and the level of short interest that are consistent with short-sale constraints for certain of the At-Issue Stocks.[289]

141. As discussed in **Section VI.D.1** above, one important cost faced by potential short sellers is the cost of borrowing shares as "higher loan fees reduce the profits from short selling" and make it so a larger mispricing is needed in order for it to be economically worthwhile for a short seller to trade.[290] Short sellers may be concerned not just about the current cost of borrowing but also the cost of borrowing over the duration of the short position.[291] To the extent the cost of borrowing is high (or the expected future cost of borrowing is high), that is consistent with it being harder or costlier to sell the stock short, which in turn can impede market efficiency.[292]

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[287] Plaintiffs claim that there were "questions raised about whether Robinhood colluded with hedge funds and market makers ***to stop an alleged short squeeze by retail investors***" (Complaint, ¶ 80, emphasis added). See also Motion to Dismiss Order, p. 51.

[288] Complaint, ¶¶ 40–42.

[289] My focus on a subset of the At-Issue Stocks in this section is meant to provide examples of potential short-sale constraints based on the data from S3 Partners available to me and is not meant to indicate that there were no constraints on short selling for the other stocks. For example, as described above, Allen et al. (2023) finds evidence of short squeezes in five of the nine At-Issue Stocks using short-selling data from a different source, IHS Markit (Allen et al. (2023), Table 1). As discussed above, short sellers face a variety of risks that may constrain their ability to trade to correct mispricing, such as margin requirements and the possibility of a margin call and the risk of a stock loan being recalled or rerated (Brealey et al. (2011), pp. 327–328; Engelberg et al. (2018), p. 755). Not all of these risks are easy to quantify. For example, a news article published on January 26, 2021 quotes Steve Sosnick, chief strategist at Interactive Brokers, a large brokerage firm, stating that "short sellers should be on alert. 'I believe there is a systemic targeting of highly shorted stocks'" ("Another GameStop? Here Are the Next 10 Most Shorted Small-Caps," *Barron's Online*, January 26, 2021). The risk of coordinating retail investors causing a short squeeze and forcing short sellers out of their positions could inhibit market participants' willingness to engage in short selling when facing an apparent mispricing (Allen et al. (2023), p. 1).

[290] Engelberg et al. (2018), p. 756.

[291] "[A] short seller is concerned not only with the level of fees, but also with fee variance" because short sellers face the risk of changing loan fees (D'Avolio (2003), p. 279; Engelberg et al. (2018), p. 756).

[292] See e.g., D'Avolio (2002), p. 274; Engelberg et al. (2018), pp. 755, 756.

142. **Exhibit 15** presents the weighted average cost of borrowing across outstanding short positions for the At-Issue Stocks in the period leading up to and during the proposed Class Period.[293] During this period, GameStop, Koss, and AMC experienced high costs of borrowing. GameStop's average cost of borrowing on outstanding short positions was high leading up to the proposed Class Period, and increased from 24% on January 20, 2021 to a peak of 38% on January 25, 2021. Koss experienced an even more dramatic increase in the cost of borrowing during this period, rising from 25% on January 20, 2021 to 44% on January 27, 2021, and reached a maximum of 76% on January 29, 2021.[294]

143. For context, an academic study by Muravyev et al. (2022) analyzes a large sample of U.S. equities over the period from July 2006 to August 2015 and finds that the 99th percentile cost of borrowing was 15%, well below the costs faced by short sellers of GameStop and Koss during this period.[295] AMC's cost of borrowing also exhibited unusual patterns in the lead up to the proposed Class Period. The borrowing cost for AMC stocks was above 60% in early January 2021 before gradually declining (and then increasing again on January 27, 2021 to 11%).

144. Additionally, a measure of the cost associated with opening a new short position in GameStop and Koss (versus the prior metrics, which represent the average cost across all open short positions) showed even higher borrowing costs faced by prospective new short sellers. This measure reached a peak of 200% on January 26, 2021 for GameStop, 159% on January 28, 2021 for Koss, and 36% on January 28, 2021 for AMC.[296] An annual fee of 200% indicates that

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[293] The cost of borrowing presented is the "Offer Rate" variable from S3 Partners, which represents the weighted-average borrowing rate paid by short sellers for all existing short positions ("S3 Short Interest and Data Field Definitions," *S3 Partners*).

[294] **Exhibit 15**.

[295] Muravyev et al. (2022), p. 1802. The variable used by Muravyev et al. (2022) comes from Markit and is defined as "[t]he expected borrow cost, in fee terms, for a hedge fund on a given day. This is a derived rate using Data Explorers proprietary analytics and data set. The calculation uses both borrow costs between Agent Lenders and Prime Brokers as well as rates from hedge funds to produce an indication of the current market rate. It should not be assumed that the indicative rate is the actual rate a Prime Broker will quote or charge but rather an indication of the standard market cost." Consistent with this finding, Engelberg et al. (2018) finds that the 99th percentile cost of borrowing was 14.79% across a sample of 4,500 U.S. stocks from July 2006 to December 2011. Both studies used data from Markit, although the specific variables used differed between the two, as the Engelberg et al. (2018) measure is computed from lender-side fees while the Muravyev et al. (2022) measure is computed from buy-side indicative fees (Muravyev et al. (2022), p. 1803; Engelberg et al. (2018), pp. 762–763).

[296] S3 Partners provides multiple measures of the cost of borrowing. The variable "Last Rate" associated with the cost of opening new short positions is defined as the "market composite lending fee earned for incremental shares loaned on that date" ("S3 Short Interest and Data Field Definitions," *S3 Partners*). When the Last Rate variable is above the Offer Rate variable, that typically indicates it is becoming harder to borrow that stock. As discussed in D'Avolio (2002) and Engelberg et al. (2018), "a short seller is concerned not only with the level of fees, but also with fee variance" because short sellers face the risk of changing loan fees (D'Avolio (2002), p. 279; Engelberg et al. (2018), p. 756).

a short seller would pay twice the price of the stock over the course of the year to maintain the short position.

145. Another relevant metric when considering constraints to short selling and the potential for a short squeeze is the total level of short interest, as short squeezes often occur in stocks with very high levels of short interest. Additionally, as discussed above, there is contemporaneous commentary that certain of the At-Issue Stocks were being targeted due to their high short interest. **Exhibit 16** presents short interest in the At-Issue Stocks as a percentage of the shares outstanding. Several of the At-Issue Stocks exhibit patterns in which there were high levels of short interest in early January 2021, which then drop in the period leading up to and during the proposed Class Period, consistent with the findings in the Allen et al. (2023) working paper discussed above.[297]

146. For example, GameStop's short interest as a percentage of its shares outstanding was over 100% in early January 2021 and above 80% through mid-January 2021.[298] For context, the Muravyev et al. (2022) study analyzes a large sample of U.S. equities over the period from July 2006 to August 2015 and finds that the 99th percentile of short interest as a percentage of shares outstanding was 30%.[299] Thus, GameStop's short interest was far higher than the 99th percentile benchmark, but began to decline sharply in the week leading up to the proposed Class Period (over the same period where it experienced a large price increase). Short interest fell from an estimated 222 million shares, or 79% of shares outstanding as of January 20, 2021, to 85 million shares, or 30% of shares outstanding as of January 29, 2021.[300] Similar patterns of initially high but declining short interest can also be observed in Bed Bath & Beyond and AMC, for which

[297] Allen et al. (2023), Figure 2. The working paper does not find evidence of a short squeeze in BlackBerry, Koss, Nokia, or Trivago (Allen et al. (2023), Table 1).

[298] See **Exhibit 16**. Note that I use short interest as a percentage of shares outstanding in this discussion in order to make a comparison to the distribution reported in the academic literature, such as Muravyev et al. (2022). However, other sources reported GameStop's short interest as a percentage of its public float (a subset of its shares outstanding), which reached even higher levels than the percentage of shares outstanding measure discussed in this section. See e.g., SEC Report, p. 21 ("Some institutional accounts had significant short interest in GME prior to January 2021 GME short interest (as a percent of float) in January 2021 reached 122.97%, far exceeding other meme stocks…").

[299] Muravyev et al. (2022), p. 1802. Consistent with this, the SEC Report on the January 2021 meme stock episode stated that "[f]ew stocks, if any, have short interest greater than 50% on a given date … [f]or example, during the significant market turbulence in 2008, 12 stocks had short interest of more than 50% on a single record date" (SEC Report, p. 25).

[300] Consistent with this, the SEC Report noted that "particularly during the earlier rise from January 22 to 27 the price of GME rose as the short interest decreased" (SEC Report, p. 25).

short interest fell from 58% to 26% and from 27% to 14%, respectively, over the same period from January 20, 2021 to January 29, 2021.

147. The sharp decrease in short interest for GameStop in particular is consistent with evidence that several large short sellers closed out their positions in GameStop around this time. For example, the SEC Report on the January 2021 meme stock episode, which used consolidated audit trail ("CAT") data that are not publicly available, noted that there were "discrete periods of sharp price increases during which accounts held by firms known to the staff to be covering short interest in GME were actively buying large volumes of GME shares, in some cases accounting for very significant portions of the net buying pressure during a period."[301] It further noted that "buy volume from participants identified as having large short positions, increased significantly beginning around January 22 and remained high for several days, corresponding to the beginning of the most dramatic phase of the run-up in GME's price."[302]

148. In summary, the data from the stock lending market provide evidence of constraints that may have inhibited the ability of arbitrageurs and other market participants to sell short certain At-Issue Stocks. The existence of short-sale constraints or short squeezes that contributed to the unusual price movements of the At-Issue Stocks during the Relevant Period would be inconsistent with market efficiency.

VII. Opinion 2: If the At-Issue Stocks Traded in Efficient Markets before and throughout the Proposed Class Period, One Would Not Expect Robinhood's Trading Restrictions to Have Allegedly "Artificially Distorted" Prices

149. I understand that Plaintiffs allege that Robinhood's temporary trading restrictions on stock purchases of the At-Issue Stocks "manipulated" the markets for those stocks and caused their prices to be "artificially distort[ed] throughout the week."[303] In this section, I discuss the inconsistency between Plaintiffs' liability theory (in particular, the allegation that Robinhood's temporary trading restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period) and market efficiency. As explained below, these two claims are fundamentally at odds. If Plaintiffs' allegations were true and Robinhood's

[301] SEC Report, p. 26.
[302] SEC Report, p. 26.
[303] Complaint, ¶¶ 12, 14.

restrictions impacted the prices of the At-Issue Stocks "artificially" throughout the proposed Class Period, that would be inconsistent with market efficiency. Conversely, if the markets for the At-Issue Stocks were efficient, contrary to the evidence I have discussed in **Section VI**, I see no reason why restrictions on a subset of retail investors that account for a fraction of the overall market would have "artificially distorted" the stock price throughout the proposed Class Period.

150. As an initial matter, Robinhood's customers were retail investors who had on average much smaller account balances than customers of other retail brokerage firms.[304] In addition, as shown in **Exhibit 17**, based on the data I have reviewed, the average total *buy* volume from Robinhood's customers accounted for on average 4.5% of the total market trading volume across the At-Issue Stocks during the week prior to the proposed Class Period, when the stock prices experienced large increases.[305, 306] Over this same period, the *net buy* (i.e., buy minus sell) volume from Robinhood's customers accounted for on average 1.0% of total market volume across the At-Issue Stocks.[307] During the proposed Class Period, when the At-Issue Stock prices generally declined, Robinhood's customer *sell* volumes accounted for on average 2.2% of total market volume across the At-Issue Stocks; and their *net sell* (i.e., sell minus buy) volume accounted for on average 0.6% of total market volume across the At-Issue Stocks.[308] Thus, Robinhood customers' net buys during the week leading up to the proposed Class Period, or their net sells during the proposed Class Period, on average accounted for 1.0% or less of the overall market volume across the At-Issue Stocks.

151. In addition, to the extent that some Robinhood customers had accounts with other brokerages, they could have traded through other platforms if they wanted to purchase the At-Issue Stocks during the proposed Class Period when Robinhood imposed more stringent trading restrictions than certain other brokers.

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[304] For further discussion, see **Section V.A** above.

[305] **Exhibit 17** shows Robinhood's buy and sell volume as a percentage of total market volume for the period prior to the proposed Class Period (January 21, 2021 to January 27, 2021) and during the proposed Class Period (January 28, 2021 to February 4, 2021), as well as on each day leading up to and during the Proposed Class Period individually.

[306] Robinhood's customer buy volume as a percentage of total market trading volume during the week prior to the proposed Class Period ranges from 0.7% to 7.5%: purchases of Tootsie Roll by Robinhood customers accounted for 0.7% of all Tootsie Roll volume during the period prior to the proposed Class Period, the lowest among the At-Issue Stocks during this period; and purchases of Trivago accounted for 7.5% of all Trivago volume, the highest among the At-Issue Stocks, over this period.

[307] Specifically, across the At-Issue Stocks, Robinhood's customer net buy volume as a percentage of total market volume ranges from 0.2% to 3.2%.

[308] Specifically, across the At-Issue Stocks, Robinhood's customer sell volume as a percentage of total market trading volume during the proposed Class Period ranges from 0.7% to 3.2%; Robinhood's customer net sell volume as a percentage of total market volume ranges from to 0.1% to 1.3% across the At-Issue Stocks.

152. Plaintiffs appear to claim that by affecting a subset of retail investors who accounted for a fraction of the overall market, Robinhood's trading restrictions caused prices to be "artificially distorted" throughout the proposed Class Period. If this were true, then the markets for the nine At-Issue Stocks could not have been efficient throughout the proposed Class Period. As discussed in **Section VI.A** above, market efficiency is driven by competition among market participants. Investors and arbitrageurs are incentivized to trade on new, value-relevant information that has not been incorporated into the stock prices. The effect of competition means that a market does not need *all* investors to have unlimited access or ability to trade on value-relevant information for prices to reflect that information efficiently.

153. If the At-Issue Stocks were efficient throughout the proposed Class Period, Plaintiffs would have to square this "market efficiency" claim with their allegation that absent any new, value-relevant information about At-Issue Stocks, the act of restricting trading of *a portion* of the (retail) investors from *one* trading platform impacted the stock prices. For argument's sake, suppose Plaintiffs are correct and a portion of retail investors were temporarily excluded from the market as a result of Robinhood's trading restrictions, and this somehow caused a temporary "artificial" decline in the price of the At-Issue Stocks. In efficient markets, other unaffected investors (in particular, arbitrageurs) would be expected to quickly enter the market, trade profitably, and thus reverse any temporary mispricing. The notion that excluding retail market participants from trading through one brokerage firm's platform would cause stock prices to be "artificially distorted" for a period as long as six trading days (the proposed Class Period) is inconsistent with market efficiency.

154. As discussed above, *Cammer* Factor 3 specifically recognizes the importance of arbitrageurs having the ability to trade to allow prices to quickly and fully incorporate information.[309] In this case, sophisticated institutional investors and arbitrageurs, who would be expected to have the ability to trade on information and discipline prices under the assumption of an efficient market, would not have been prevented from buying the At-Issue Stocks due to Robinhood's restrictions.[310] In the absence of new, value-relevant information about the At-Issue Stocks, these unrestricted, sophisticated institutional investors would be expected to quickly enter the market and buy the stocks if their prices declined "artificially" due to restrictions

[309] **Section VI.A**.

[310] See **Section V.A** for a discussion of Robinhood's business, which specifically caters to retail investors.

imposed on a portion of retail investors. If institutional investors could not (or did not) trade to quickly reverse such purported "artificial" declines due to Robinhood's restrictions, then the markets would be *inefficient*.

155. As an example, if the price of IBM stock was $100 and a Robinhood restriction on trading by its retail customers in IBM resulted in the stock price "artificially" dropping to $80 without any new, value-relevant information, arbitrageurs would see that the $20 drop was not due to any negative news about IBM's business. If $100 was an efficient market price in the first place, then investors would quickly buy IBM stock at $80 and continue to buy until the price reached $100 per share. In an efficient market, this process should occur rapidly. Therefore, when the market is efficient with well-functioning arbitrageurs, restricting a subset of retail investors from trading on one platform should not result in a sustained price decline.

156. Alternatively, if Plaintiffs' liability theory holds and the prices of the At-Issue Stocks were "artificially distorted" due to Robinhood's restrictions during the proposed Class Period and were not quickly corrected, then this claim implies that the arbitrageurs were limited in their ability to correct "mispricing" and therefore the markets for the At-Issue Stocks were inefficient.[311]

157. In short, if the markets for the At-Issue Stocks were efficient, this would be inconsistent with Plaintiffs' allegations that Robinhood's restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period.

VIII. Opinion 3: Plaintiffs Face Fundamental Challenges in Providing a Class-Wide Damages Methodology That Is Consistent with Their Theory of Liability in This Action

158. In this section, I discuss fundamental challenges that Plaintiffs will face in providing a reliable, class-wide damages methodology that is consistent with their theory of liability.

[311] Note that I have discussed that Plaintiffs will be unable to demonstrate market efficiency during the period immediately before the proposed Class Period for the At-Issue Stocks, potentially due to destabilizing speculation through "noise traders" coordination that could inhibit arbitrageurs' ability and willingness to correct mispricing. My understanding of Plaintiffs' theory, however, is not that Robinhood's trading restrictions (imposed on only a portion of the retail traders) helped curtail the destabilization that could have caused the market to be inefficient before the proposed Class Period (i.e., actually helped corrected the mispricing and restored market efficiency for At-Issue Stocks), but rather that Robinhood's trading restrictions "artificially distorted" the stock price from an efficient level throughout the proposed Class Period.

159. I understand from counsel that at class certification in a securities case such as the current lawsuit, Plaintiffs must be able to put forward a methodology that is (i) applicable on a class-wide basis, and (ii) capable of reliably calculating damages for putative class members in a manner consistent with their theory of liability. I understand that Plaintiffs do not need to compute damages or assess loss causation at this stage of litigation.

160. This case involves unique fact patterns and economic issues that represent tremendous challenges for Plaintiffs' ability to put forth a reliable class-wide damages methodology consistent with their theory of liability. Specifically, this case involves alleged manipulation in the form of trading restrictions imposed by Robinhood on the nine At-Issue Stocks, with Plaintiffs alleging that "the price of the Affected Stocks were [*sic*] depressed by Robinhood artificially restricting demand" and members of the proposed class were thereby damaged when they "sold such shares at a loss."[312]

161. The Complaint does not articulate what would have occurred in the counterfactual scenario where the alleged manipulation did not take place. For the purposes of this report, I have been asked to assume that the counterfactual scenario is one in which the large price movements discussed in **Section VI** above occurred (as they in fact did) prior to the proposed Class Period, including any alleged retail investor coordination and short squeezes in the At-Issue Stocks. I have also been asked to assume that in the counterfactual scenario, other retail brokers would still have imposed restrictions (as they in fact did), but Robinhood would not have imposed any trading restrictions. Thus, in order to calculate "artificial deflation" resulting from the trading restrictions, and therefore damages, Plaintiffs would need to provide a methodology that would be able to reliably estimate the prices for the At-Issue Stocks that would have prevailed throughout the proposed Class Period (i.e., the but-for price) taking into account the set of restrictions that would have existed in the counterfactual scenario.

162. Below, I discuss fundamental challenges that Plaintiffs face in calculating such but-for prices, and thus providing a reliable class-wide damages methodology that is consistent with their theory of liability.[313] First, Plaintiffs face fundamental challenges in reliably determining the but-for price that would have prevailed had Robinhood not imposed restrictions, if it is

[312] Complaint, ¶¶ 1, 124.

[313] To be clear, I am not suggesting that Plaintiffs need to perform a damages or loss causation analysis at this stage, but rather I am pointing out the unique challenges in formulating a methodology capable of reliably measuring but-for prices and purported artificial deflation in a manner consistent with Plaintiffs' theory of liability in this action.

assumed that the markets for the At-Issue Stocks were *not* efficient such that the trading restrictions could have affected stock prices. As discussed in **Section VIII.A** below, Plaintiffs would need to propose a methodology that could identify whether and how market participants (both Robinhood investors and others) would have traded and the evolution of trading and prices in the counterfactual scenario, taking into account that the restrictions imposed by other brokers would have still existed. I am unaware of a formulaic approach or data, let alone traditional methodological tools such as event studies that Plaintiffs may propose, that would allow Plaintiffs to reliably calculate such but-for prices (i.e., the prices that would have resulted from the hypothetical supply and demand equilibrium where Robinhood did not impose restrictions) in such a setting where markets are *in*efficient.

163. In **Section VIII.B**, I explain that, further complicating the challenges discussed in **Section VIII.A**, any methodology Plaintiffs put forth to measure but-for prices and "artificial" price deflation, and thus damages, must be able to reconcile why the trading restrictions would have affected the prices of the At-Issue Stocks (according to Plaintiffs' allegations), but not the prices of other stocks with similar restrictions. In **Section VIII.C**, I explain that a damages methodology must be able to account for an additional complicating factor in that Robinhood's trading restrictions changed over the proposed Class Period. In **Section VIII.D**, I explain that for any methodology Plaintiffs put forth to measure damages for their Section 9(a) claim to be reliable, it must be able to calculate the but-for prices where the subset of alleged actions specifically connected to those claims were absent but the PCO restrictions and position limits were still in place.

A. Plaintiffs Face Fundamental Challenges in Putting Forward a Methodology for Determining a But-For Price for Calculating Damages on a Class-Wide Basis That Can Reliably Assess the Impact, If Any, of Restrictions Imposed by Robinhood and Other Brokers

164. As I discuss above, in an efficient market the only factor that should affect the price of a stock is new, value-relevant information related to the company's expected future cash flows or the risks to those cash flows. As a corollary, prices in an efficient market "should not react to changes in demand or supply of a security that are not accompanied by news about its

fundamental value."[314] Therefore, if it is true that the At-Issue Stocks did not trade in efficient markets and temporary changes in supply and demand for a given stock could "distort" their price in the absence of any new, value-relevant information, then to determine the stock price deflation, if any, one would presumably need to put forth a methodology to measure the but-for price that somehow was determined by supply and demand equilibrium in the counterfactual scenario where only Robinhood did not impose trading restrictions.

165. Even assuming Plaintiffs could come up with an approach to do so, assessing such but-for demand and supply would require one to know how different investors would have been affected by Robinhood's trading restrictions, if at all, and how they would have traded differently but for Robinhood's restrictions.[315] For example, some Robinhood investors may have been able to trade via other brokers and thus their trading behavior would not have been affected by the restrictions, meaning that their activity may not have had any impact on supply and demand in the counterfactual scenario. Furthermore, as discussed in **Section V.C** above, certain other brokers also imposed trading restrictions. For example, E*Trade, Trading 212, and all brokers whose transactions were cleared by Apex had PCO restrictions in place on January 28, 2021 for GameStop and AMC.[316] Thus, the ability of Robinhood investors to trade on other platforms would be affected by the restrictions imposed by other brokers. Consequently, reliably modeling the impact of Robinhood's trading restrictions on its own investors could involve examining individual investor behavior to determine what trading alternatives were available to each investor, each investor's willingness to trade on a substitute platform (perhaps needing to open a new brokerage account to do so), and how each investor's decision to trade may have been impacted by the restrictions, including those of other brokers.

166. Even assuming it would be possible to assess the impact of Robinhood's trading restrictions on individual investors' ability to trade, a reliable methodology would also involve understanding how the restrictions may have impacted the actual trading decisions by individual

[314] Shleifer (2000), p. 5 ("[S]ince a security's price must be equal to its value, prices should not move without any news about the value of the security. That is, prices should not react to changes in demand or supply of a security that are not accompanied by news about its fundamental value.").
[315] This is applicable to all of the actions that Plaintiff allege to be manipulative, including canceling purchase orders on the morning of January 28, 2021, liquidating customers' shares, and closing out options.
[316] "E-Trade confirms it halted GameStop and AMC stock, will let you buy some Friday," *The Verge*, January 28, 2021, available at https://www.theverge.com/2021/1/28/22254863/etrade-gamestop-amc-stock-reddit-wallstreetbets-robinhood; Trading 212 Tweet, January 29, 2021, available at https://twitter.com/trading212/status/1355074914202628098?lang=en; "GameStop & AMC Entertainment in Reduce-Only Mode," Trading 212, available at https://community.trading212.com/t/gamestop-amc-entertainment-in-reduce-only-mode/41464; HFSC Report, p. 81.

investors. For example, Robinhood investors who (for some period of time) would only have been able to trade on Robinhood's platform in the counterfactual scenario might have halted purchases of additional shares or decided to sell their existing positions if they believed that the prices of the At-Issue Stocks had already peaked after the large price run-ups, rather than continue to purchase shares. In short, the decisions by Robinhood investors could depend on stock price movements and on the prior trading activity of other investors in the counterfactual scenario.

167. In sum, estimating but-for prices for the At-Issue Stocks taking into account the impact of trading restrictions imposed by Robinhood and by other brokers would involve identifying which investors would have traded absent the Robinhood restrictions, how their trading would have depended on prices and trading by other market participants, how their trading would have subsequently influenced the trading of others, and how restrictions by other brokers would factor into these determinations. I am unaware of any formulaic approach or data that would reliably allow Plaintiffs to essentially unwind Robinhood's restrictions (and not those of other brokers) in the counterfactual scenario and reliably calculate but-for stock prices in such a setting where the market conditions are highly unusual and where there is no premise of market efficiency.

168. Plaintiffs will also not be able to use certain techniques, such as event studies, which are commonly proposed as part of damages methodologies, to the extent that those techniques require an assumption of market efficiency to draw an inference regarding the stock price impact attributed to the release of certain information.[317] As explained in a widely cited article on the event study methodology, "[t]he usefulness of [an event study] comes from the fact that, given rationality in the marketplace, the effects of an event will be reflected immediately in security prices."[318] Indeed, without the premise of market efficiency, securities prices could under-react, over-react, or react slowly to the information at issue. Put another way, in order to reliably use an event study to evaluate a cause-and-effect relationship between an information event and a change in the price of a stock, a researcher typically would need to understand whether market prices would be expected to react to information quickly and fully within the event window.

[317] To be clear, I am not suggesting that an event study can be a viable approach to measure the impact of the alleged manipulation through trading restrictions. Event studies are typically used by researchers to measure how securities prices respond to public information; here I understand the key allegation has to do with the alleged manipulative act, that is, the trading restrictions, rather than any alleged misrepresentation.

[318] MacKinlay (1997), p. 13.

B. Further Complicating the Assessment of Damages, Plaintiffs' Methodology Must Be Able to Reconcile the Lack of Observed Price Declines in Some Stocks That Faced Similar Restrictions to the At-Issue Stocks

169. For any approach Plaintiffs put forth to measure but-for prices and "artificial deflation," and thus damages, to be reliable, it must be able to reconcile why Robinhood's trading restrictions would affect only prices of the At-Issue Stocks (according to Plaintiffs' allegations) and not the prices of other stocks that had similar trading restrictions. As discussed in **Section V.C** above, the nine At-Issue Stocks were not the only ones for which Robinhood imposed trading restrictions during the proposed Class Period. As there were stocks that did not experience price movements on days when the restrictions were put in place by Robinhood, Plaintiffs would need to provide a methodology for estimating but-for prices that can reconcile the fact that only some stocks were (allegedly) negatively impacted by the restrictions, while other stocks with similar restrictions did not experience a price decline. Otherwise, Plaintiffs' damages methodology would not be capable of showing damages due to the restrictions, if the restrictions affected some stocks but not others.

170. As discussed in the Complaint, Robinhood imposed restrictions on 50 additional stocks on January 29, 2021.[319] One such example involves the stock of Inovio Pharmaceuticals Inc. ("INO"), which is not at issue. INO was restricted at 2:48PM ET on January 29, 2021, with a purchase limit of one share.[320] The following At-Issue Stocks also had a restriction of one share on that day: GME, AMC, BB, KOSS, BBBY, and TR.[321] Despite the trading restriction of INO, its stock price rose from $10.95 at the close on January 28, 2021 to $12.75 on January 29, 2021, an increase of 16.4% and a 16.8% residual increase when I conduct a regression to control for market and industry movements.[322, 323] Similarly, trading in Sorrento Therapeutics Inc. ("SRNE"), another stock not at issue, was also restricted at 2:48PM ET on January 29, 2021,

[319] Complaint, ¶ 87.
[320] Complaint, ¶ 87; RHMDL00047970.
[321] RHMDL00047970.
[322] To control for market and industry movements, I estimate the regression model described in **Appendix D** using the S&P SuperCap Biotechnology Index as the industry index. The residual increase of 16.8% is statistically significant at the 95% confidence level. Inovio Pharmaceuticals, Inc., Form 10-K for FY 2020, filed March 1, 2021, p. 64; Inovio Pharmaceuticals, Inc., Form 10-K for FY 2021, filed March 1, 2022, p. 57.
[323] Robinhood customers accounted for approximately 3.7% of total market buy volume for INO on January 28, 2021, the day prior to trading in INO being restricted. On January 27, 2021, the day prior to trading in the At-Issue Stocks being restricted, Robinhood customers' share of buy volume in the At-Issue Stocks ranged from 0.7% for Tootsie Roll to 8.1% for Nokia (see **Exhibit 17**).

with a purchase limit of one share.[324] Despite the trading restriction, the price of SRNE rose from $12.23 at the close on January 28, 2021 to $12.66 on January 29, 2021, an increase of 3.5% and a 2.6% residual increase when I conduct a regression to control for market and industry movements.[325, 326] Stocks that were restricted by Robinhood but which did not experience price declines on days when those restrictions were put in place, such as INO and SRNE, provide examples of why Plaintiffs' methodology to measure damages must be able to reconcile the allegations that Robinhood's restrictions affected the At-Issue Stocks, but not other stocks with similar restrictions.

C. Plaintiffs' Damages Methodology Must Be Able to Account for Changes in Robinhood's Trading Restrictions over Time

171. Robinhood's trading restrictions changed over the proposed Class Period and were removed altogether for seven of the nine At-Issue Stocks prior to the end of the proposed Class Period.[327] For example, over the course of the proposed Class Period, Robinhood's trading restrictions on purchases of GameStop's equity changed seven times, starting with the PCO restriction on January 28, 2021 and ending with a position limit of 500. A position limit of one share of GME would allow an investor to hold a position with a value of $325.00 at the close on January 29, 2021, while a position of 500 shares would allow an investor to hold a position with a value of $26,750.00 at the close on February 4, 2021.

172. To the extent that Robinhood's trading restrictions "artificially deflated" the prices of the At-Issue Stocks, changes in the restrictions may have different impacts on "the demand side of the equation" that Plaintiffs allege Robinhood manipulated. A reliable damages methodology would need to be able to account for any such changes in restrictions on the but-for prices of the At-Issue Stocks. Further, while some At-Issue Stocks experienced similar changes in restrictions to GameStop, others (such as Bed Bath & Beyond) had no restrictions on their trading between February 1, 2021 and February 4, 2021, four of the six trading days during the proposed Class Period. Determining the but-for price of each At-Issue Stock at each point in time throughout

[324] Complaint, ¶ 87; RHMDL00047970.
[325] To control for market and industry movements, I estimate the regression model described in **Appendix D** using the Nasdaq Biotechnology Index as the industry index. Sorrento Therapeutics, Inc., Form 10-K for FY 2020, filed February 19, 2021, p. 68; Sorrento Therapeutics, Inc., Form 10-K for FY 2021, filed March 11, 2022, p. 73.
[326] Robinhood customers accounted for approximately 3.6% of total market buy volume for SRNE on January 28, 2021, the day prior to trading in SRNE being restricted.
[327] **Exhibit 2**.

the proposed Class Period would require taking into account the specific restrictions in place at that point in time, and how the restrictions would impact supply and demand in the counterfactual scenario, further complicating the assessment of damages.

D. Plaintiffs Face Difficulties in Putting Forward a Methodology That Can Calculate Damages Reliably on a Class-Wide Basis Attributed to Robinhood's PCO and Position Limit Versus Other Restrictions

173. I understand that Plaintiffs base their claims on two sets of trading restrictions implemented by Robinhood: (i) the PCO restrictions that Robinhood put in place for the At-Issue Stocks on the morning of January 28, 2021 followed by a varying set of position limits (as described in more detail in **Section V.C** above); and (ii) three other actions that Plaintiffs allege Robinhood engaged in, namely canceling purchase orders on the morning of January 28, 2021, liquidating certain customers' shares in response to margin calls, and closing out certain options positions.[328] Furthermore, I understand that Plaintiffs are bringing claims under Sections 9(a) and 10(b) of the Exchange Act,[329] and I understand that the Motion to Dismiss Order limits the Section 9(a) claim to the three other actions (which it found constituted "transactions") that Plaintiffs allege Robinhood engaged in.[330] In other words, my understanding from counsel is that, based on the Motion to Dismiss Order, the PCO restrictions and position limits are at issue only for the Section 10(b) claim, whereas these other restrictions are at issue for both the Section 9(a) and 10(b) claims.

174. Given that I understand that different restrictions are applicable to Plaintiffs' claims under Sections 9(a) and 10(b), Plaintiffs face additional challenges in providing a class-wide damages methodology for their Section 9(a) claim, separate from their Section 10(b) claim. Any methodology that Plaintiffs put forth to measure "artificial deflation," and hence damages, for the Section 9(a) claim must be able to quantify but-for prices absent these other restrictions in a counterfactual scenario where the PCO restrictions and position limits were still in place. Such a methodology—analyzing only a subset of the actions, rather than all of them—would add to the challenges Plaintiffs face in order to put forth a damages methodology that can be tethered to their claims.

[328] Complaint, ¶ 137.
[329] Complaint, ¶¶ 136–149.
[330] Motion to Dismiss Order, pp. 16–23.

IX. Conclusion

175. In summary, I find that amid the highly unusual market conditions at this time for these stocks, the evidence is inconsistent with the notion that the markets for the At-Issue Stocks were efficient leading up to and throughout the proposed Class Period. During this period, the At-Issue Stocks experienced extreme price movements. Based on my analysis, value-relevant information about the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the Relevant Period. Consistent with this, more than half of the at-issue companies either stated that they were unaware of changes in their business conditions that would explain these price movements or that they were unaware of any undisclosed information that would account for the price movements. Instead, analysts, academic studies, other observers, and Plaintiffs themselves attribute the price movements to coordinated trading by retail investors, as well as short squeezes or attempted short squeezes, which would be inconsistent with market efficiency.

176. Further, I conclude that Plaintiffs' liability theory (in particular, the allegation that Robinhood's temporary trading restrictions caused the prices of the At-Issue Stocks to be "artificially distorted" throughout the proposed Class Period) is inconsistent with market efficiency. In an efficient market, if temporary restrictions were placed on stock trading, sophisticated institutional investors and arbitrageurs, who would not be affected by Robinhood's restrictions, would have the incentive to trade to correct any "artificial" price impact due to potential temporary supply/demand imbalances caused by such restrictions, thus preventing the stock price from being "distorted."

177. Finally, I conclude that Plaintiffs face fundamental challenges in providing a class-wide damages methodology that would be consistent with their theory of liability. I am not aware of a formulaic approach or data, let alone traditional methodological tools such as event studies, that would allow Plaintiffs to reliably calculate hypothetical prices on a class-wide basis in a setting where markets are not efficient (and thus trading restrictions could have a sustained "artificial" price impact). As a result, if Plaintiffs were to show that Robinhood's trading restrictions created "artificial deflation," they would presumably need to calculate damages based on attempted individualized inferences of whether and how investors would have traded absent the restrictions.

Executed this 24th of February, 2023



Steven Grenadier, Ph.D.

Appendix A

CURRICULUM VITAE: January 2023

Steven Grenadier

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Stanford University
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CURRENT POSITION

William F. Sharpe Professor of Financial Economics, Graduate School of Business, Stanford University

FIELDS OF SPECIALIZATION

Corporate Finance
Asset Pricing
Real Estate
Option Pricing

DOCTORAL STUDIES

Harvard Business School/Harvard Graduate School of Arts and Science

Ph.D. in Business Economics, November 1992
Concentration in Capital Markets and Corporate Finance

Dissertation: Real Estate Markets
Committee Chairman: Robert C. Merton

UNDERGRADUATE EDUCATION

University of California at Berkeley

B.S. 1987 - Summa cum laude

HONORS

The article "The Strategic Exercise of Options: Development Cascades and Overbuilding in Real Estate Markets," was nominated for the Smith Breeden Prize of the Journal of Finance in 1997

1994 Best Paper Award from the American Real Estate and Urban Economics Association and the American Institute of Individual Investors

1993 Best Dissertation Award from the American Real Estate and Urban Economics Association

Appendix A

National Doctoral Fellowship Recipient: American Assembly of Collegiate Schools of Business

Phi Beta Kappa

PUBLICATIONS

Grenadier, Steven, Lin William Cong and Yunzhi Hu (2020), "Dynamic Intervention and Informational Linkages," *Journal of Financial Economics*, 135(1), 1-15 (lead article).

Grenadier, Steven and Samuel Antill (2019), "Optimal Capital Structure and Bankruptcy Choice: Dynamic Bargaining vs Liquidation," *Journal of Financial Economics*, 133(1), 198-224.

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Grenadier, Steven and Neng Wang (2007), "Investment Under Uncertainty and Time-Inconsistent Preferences," *Journal of Financial Economics*, 84 (1), 2-39 (lead article).

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Grenadier, Steven (2000), "Option Exercise Games: The Intersection of Real Options and Game Theory", *Journal of Applied Corporate Finance*, 13 (2), 99-107.

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Grenadier, Steven (1995), "Valuing Lease Contracts: A Real-Options Approach," *Journal of Financial Economics,* 38 (3), 297-331.

Grenadier, Steven (1995), "The Persistence of Real Estate Cycles," *Journal of Real Estate Finance and Economics,* 10 (2), 95-119.

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WORKING PAPERS

"Financing the Litigation Arms Race," with Samuel Antill, under revision at the *Journal of Financial Economics*.

Appendix A

"Sandbagging Real Options," with William Cong.

"Capital budgeting and Real Options: The Case of Concealed Investment Projects," with Andrey Malenko.

EDITORIAL RESPONSIBILITIES

Editor, *Journal of Real Estate Finance and Economics*, 1996-
Associate Editor, *Journal of Economic Dynamics and Control*, 2003-2010

PROFESSIONAL ACTIVITIES

Chair of Stanford University Committee on Notre Dame du Namur University Investment Committee: Vise (2021 -)
Senior Advisor: Cornerstone Research (2013 -)
Senior Consultant: Financial Engines, Inc. (1997-2019)
Member of Stanford Affordability Task Force (2018-2019)
Member of Stanford Faculty Senate (2011-2016)
Member of the Stanford University Retirement Program Investment Committee, 2005-2012
Director of AQR Funds (2008-2011)
Director of Nicholas Applegate Institutional Funds (2007-2010)
Director of E*Trade Funds (1999-2008)

TEACHING EXPERIENCE

Finance, Base Level: 2022
Private Equity and Investment Seminar: 2018-
Investment Management and Entrepreneurial Finance: 2018-
Modeling for Investment Management: 2009-
Critical Analytical Thinking: 2010-2012
Essentials of Real Estate Investment: 1994-2008
Foundations of Financial Economics: 1995-1997, 2006-2010
Portfolio Management: 1992-2005
Finance Core: 1993

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Finance Association (AFA)

Appendix B

Steven Grenadier
Prior Testimony in Previous Four Years

Duane & Virginia Lanier Trust, et al., v. SandRidge Mississippian Trust I, et al., Case No. 5:15-cv-00634-G (U.S. District Court Western District of Oklahoma). Deposition: June 2019.

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MBIA Insurance Corporation v. Credit Suisse Securities (USA) LLC, DLJ Mortgage Capital, Inc. and Select Portfolio Servicing, Inc., Case No. 603751/2009 (Supreme Court of The State Of New York County Of New York). Trial Testimony: August 2019.

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Ambac Assurance Corporation v. U.S. Bank National Association, Case No. 17-cv-2614-PAE (U.S. District Court Southern District of New York). Deposition: August 2021.

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Allen Munro et al., v. University of Southern California et al., Case No.: 2:16-cv-06191 (Central District of California, Western Division). Deposition: September 2022.

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Appendix C

Documents Considered List

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- F. Allen, et al. (2023), "Squeezing Shorts Through Social Media Platforms," Working Paper
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Appendix C

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Appendix D

I. Two-Factor Model of At-Issue Stocks

1. I estimate a two-factor regression model (i.e., controlling for market and industry movements) for each of the nine At-Issue Stocks over a 120-trading-day period ending on December 31, 2020.[1] I use the S&P 500 Total Return Index as the measure of overall market movements. To control for industry movements, I review the FY2020 and FY2021 SEC filings of the At-Issue Stocks to identify any industry indices that the companies used for the purpose of stock performance comparisons. If the filings contain such an index, then I use it to control for industry movements in my regression model.[2] **Figure D-1** lists the industry indices that I identified in the SEC filings of the At-Issue Stocks.

Figure D-1: Industry Indices for Stock Performance Comparison Identified in At-Issue Stock SEC Filings, FY2020 – 2021

At-Issue Stock	Industry Index
Bed Bath & Beyond, Inc.	S&P 500 Specialty Retail Index
BlackBerry Limited	S&P 500 Information Technology Index
Express, Inc.	Dow Jones U.S. Apparel Retailers Index
GameStop Corp.	Dow Jones Specialty Retailers Index
Tootsie Roll Industries, Inc.	Dow Jones U.S. Food Producers Index

Source: At-Issue Stocks 10-K and 20-F Filings for FY2020 – 2021
Note: Bed Bath & Beyond also identified the S&P Retail Composite Index in its FY2020 and FY2021 SEC filings.

[1] The estimation period is between July 14, 2020 and December 31, 2020, which begins after the initial months of the COVID-19 pandemic and ends before the meme stock period in January 2021. Academic research analyzing stock price movements often uses a 120-trading-day estimation period prior to the period under study. For example, in the context of event studies, MacKinlay (1997) states, "Given the selection of a normal performance model, the estimation window needs to be defined. The most common choice, when feasible, is using the period prior to the event window for the estimation window. For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event. Generally the event period itself is not included in the estimation period to prevent the event from influencing the normal performance model parameter estimates" (MacKinlay (1997), p. 15).

[2] Bed Bath & Beyond identified two industry indices—the S&P 500 Specialty Retail Index and the S&P Retail Composite Index—in its SEC filings. I present in my report the results from a regression model that uses the S&P 500 Specialty Retail Index as its industry factor. I also estimated a model for Bed Bath & Beyond using the S&P Retail Composite Index, and the results are similar and do not change my opinions.

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2. If a company did not identify such an index in its SEC filings, I construct an equal-weighted industry index using the competitors that the company identified in its SEC filings.[3] **Figure D-2** lists the competitors that I use to construct my equal-weighted index of each At-Issue Stock's U.S. exchange-traded competitors.

[3] Only U.S. exchange-traded competitors are included in the index. I use an equal-weighted index because AMC and Koss only had two U.S. exchange-traded competitors. As a robustness check, I used S&P Capital IQ, a widely used provider of financial information, to identify an industry index for those two companies. I identified the S&P United States BMI Media & Entertainment Index, which is a GICS®-based subindex of the S&P Global Broad Market Index, for AMC ("S&P Global BMI," *S&P Global*, available at https://www.spglobal.com/spdji/en/documents/education/brochure-sp-global-bmi.pdf), and the S&P TMI Consumer Discretionary Index, which comprises those companies included in the S&P Total Market Index that are classified as members of the GICS® Consumer Discretionary sector, for Koss ("S&P Total Market Index (TMI) Consumer Discretionary," *S&P Global*, available at https://www.spglobal.com/spdji/en/indices/equity/sp-total-market-index-tmi-consumer-discretionary/#overview). Estimating the two-factor model for AMC and Koss using these industry indices produces similar results and does not change my opinions. I also estimated the models for AMC, Koss, Nokia, and Trivago using a value-weighted index of competitors, and the results are similar and do not change my opinions.

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Figure D-2: Competitors Identified in At-Issue Stock SEC Filings, FY2020 – 2021

At-Issue Stock	Number of Competitors	U.S. Exchange-Traded Competitors[1]	Other Competitors
AMC Entertainment Holdings, Inc.	2	Cinemark Holdings, Inc. IMAX Corporation	
Koss Corporation	5	Apple Sony	Bose LG[2] Samsung
Nokia Corporation[3]	34	Adtran Amdocs Arista Aviat Calix Ceragon Ciena Cisco Commscope Ericsson HPE IBM Infinera Juniper Motorola Oracle	Airspan Altiostar Athonet Celona Fiberhome Fujitsu Huawei JMA Wireless KMW Kontron Mavenir MTI NEC Netcracker Parallel Wireless Samsung Subcom ZTE
trivago N.V. (TRVG)[3]	19	Airbnb[4] Bing[5] Booking.com Ctrip[6] Expedia Facebook[7] Google[8] Hilton Kayak[9] Marriott Qunar[6] Skyscanner[6] Trip.com TripAdvisor Twitter Vrbo[10] Yahoo![11]	Accor Naver

Source: At-Issue Stocks 10-K and 20-F Filings for FY2020 – 2021; Competitors' SEC Filings; *CRSP*
Note:
[1] A competitor is deemed to be U.S. exchange-traded if its common shares or ADRs were eligible for inclusion in the CRSP U.S. Stock database during the period between July 14, 2020 and February 4, 2021.
[2] Neither LG Electronics nor LG Corporation (the holding company of the LG Group) has an ADR. LG Display, which is an affiliate of the LG Group, does have an ADR, but this company is a manufacturer of electronic displays.
[3] This At-Issue Stock divided its business activities into different business segments. Some of the competitors listed compete with the At-Issue Stock in only a specific business segment.
[4] Airbnb was not included in the competitor index because it does not have returns available every day for the entire 120-trading day estimation period between July 14, 2020 and December 31, 2020.
[5] Bing is a subsidiary of Microsoft Corp. The returns of Microsoft Corp. are used to build the industry index for trivago N.V.

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[6] This U.S. Exchange Traded Competitor is a subsidiary of Trip.com Group Ltd. The holding company name was changed from Ctrip.com International, Ltd. to Trip.com Group Ltd. in 2019. The returns of Trip.com Group Ltd. are used to build the industry index for trivago N.V.
[7] Facebook changed its corporate name to Meta Platforms, Inc in October 2021.
[8] Google Hotel Ads and YouTube are part of Google's suite of products. The returns of Alphabet Inc. are used to build the industry index for trivago N.V.
[9] Kayak is a subsidiary of Booking Holdings Inc. The returns of Booking Holdings Inc. are used to build the industry index for trivago N.V.
[10] Vrbo is a subsidiary of Expedia Group, Inc. The returns of Expedia Group, Inc. are used to build the industry index for trivago N.V.
[11] Yahoo! is a subsidiary of Verizon Communications Inc. The returns of Verizon Communications Inc. are used to build the industry index for trivago N.V.

3. **Figure D-3** summarizes the parameter estimates of the two-factor regression model that I estimate for each At-Issue Stock.

Figure D-3: Two-Factor Regression Model for At-Issue Stock Returns Estimated over a 120-Trading-Day Period Ending 12/31/20

At-Issue Stock	Market Coefficient (S&P 500)	Industry Coefficient	Intercept	F-Statistic	F-Statistic P-Value	Adjusted R-Squared	RMSE
AMC Entertainment Holdings, Inc.	**1.63***	**1.12***	-0.01	**55.30***	< 0.01	47.7%	5.9%
Bed Bath & Beyond, Inc.	**1.36***	**1.94***	0.01	**17.92***	< 0.01	22.1%	3.8%
BlackBerry Limited	**1.23***	0.42	0.00	**8.72***	< 0.01	11.5%	3.4%
Express, Inc.	**1.63***	**2.26***	0.00	**26.41***	< 0.01	29.9%	6.5%
GameStop Corp.	**1.62***	0.43	0.01	**3.18***	0.05	3.5%	7.6%
Koss Corporation	0.54	0.62	0.01	1.16	0.32	0.3%	6.7%
Nokia Corporation	**0.92***	**0.63***	0.00	**14.34***	< 0.01	18.3%	2.3%
Tootsie Roll Industries, Inc.	**0.41***	**1.07***	0.00	**27.53***	< 0.01	30.8%	1.1%
trivago N.V.	**1.12***	**1.99***	0.00	**21.31***	< 0.01	25.4%	4.2%

Source: At-Issue Stocks 10-K and 20-F Filings for FY2020 – 2021; *Bloomberg*; *CRSP*; Refinitiv Eikon
Note: The two-factor model is estimated over a 120-trading-day period ending on December 31, 2020. The model regresses the daily dividend-adjusted returns of the At-Issue Stock on the total returns of the S&P 500 Index and the corresponding industry index, which is identified using the FY2020 and FY2021 SEC filings of the At-Issue Stocks. If a company identifies in its SEC filings an industry index for the purpose of stock performance comparisons, then that index is used to control for industry movements in the regression model. If a company did not identify such an index in its SEC filings, then an equal-weighted index of the U.S. exchange-traded competitors identified in its SEC filings is used instead. The industry index returns are orthogonalized with respect to the S&P 500 returns. Statistical significance of model coefficients is determined at the 5% level using a two-tailed test.

II. Relative Performance of At-Issue Stocks to Other NYSE- and Nasdaq-Listed Stocks

4. I analyze the distribution of returns for 4,232 stocks—the nine At-Issue Stocks and 4,223 comparison stocks—that were listed on the NYSE and Nasdaq in the period leading up to and during the proposed Class Period (see **Section VI.B.**). To account for differences in the sensitivity of individual stock returns to market movements, I analyze the distribution of residual returns for the 4,232 stocks after controlling for their exposure to the market. Specifically, for each of the 4,232 stocks in my analysis, I estimate a one-factor model by regressing the daily returns of each stock on the returns of the S&P 500 Total Return Index over a 120-trading-day

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period ending on December 31, 2020.[4] I then use the one-factor models to estimate the residual returns for each stock for the period between January 21 and February 4, 2021.[5]

5. **Figure D-4** replicates my analysis in **Figure 2** using cumulative *residual* returns as the metric for comparing the performance of all NYSE- and Nasdaq-listed stocks during the period between January 21 and 27, 2021. Consistent with my analysis of the cumulative raw returns of these companies, the At-Issue Stocks posted among the largest cumulative residual returns in the five trading days leading up to the proposed Class Period.

Figure D-4: Cumulative Residual Returns of At-Issue Stocks Relative to Contemporaneous Performance of NYSE/Nasdaq Stocks, 1/21/21 – 1/27/21

At-Issue Stock	Percentile Rank	Rank (Out of 4,232)	Cumulative Residual Return (1/21 – 1/27)
Koss Corporation	100.0%	1st Largest	1,551%
GameStop Corp.	100.0%	2nd Largest	765%
Express, Inc.	100.0%	3rd Largest	747%
AMC Entertainment Holdings, Inc.	99.9%	4th Largest	591%
Bed Bath & Beyond, Inc.	99.8%	9th Largest	112%
BlackBerry Limited	99.7%	13th Largest	100%
Nokia Corporation	99.2%	33rd Largest	60%
trivago N.V.	99.1%	40th Largest	53%
Tootsie Roll Industries, Inc.	98.9%	46th Largest	46%

Source: *CRSP*; Refinitiv Eikon
Note: Residual returns are calculated using a one-factor model that regresses the daily returns of the stock on the returns of the S&P 500 Index during a 120-trading-day estimation period between 7/14/20 and 12/31/20. This analysis is limited to common stocks and ADRs listed on the NYSE and Nasdaq that have returns available every day for the entire 120-trading-day estimation period and between 1/21/21 and 2/4/21. There are 4,232 stocks included in this analysis. The cumulative residual return is calculated as the product of (1 + daily residual return) minus 1 between 1/21/21 and 1/27/21.

6. Similarly, **Figure D-5** replicates my analysis in **Figure 3** using cumulative *residual* returns as the metric for comparing performance among all NYSE- and Nasdaq-listed stocks during the proposed Class Period. Consistent with my analysis of the cumulative raw returns,

[4] I use one-factor models in this analysis due to the difficulty in identifying an appropriate industry index for all 4,223 comparison stocks.
[5] Ross et al. (2002), p. 291 ("In our preceding example we … used inflation, GNP, and the change in interest rates as examples of systematic sources of risk, or factors. … In practice, researchers frequently use a one-factor model for returns. They do not use all of the sorts of economic factors we used previously as examples; instead, they use an index of stock market returns—like the S&P 500, or even a more broadly based index with more stocks in it—as the single factor. … In this form (with minor modifications) the factor model is called a market model. This term is employed because the index that is used for the factor is an index of returns on the whole (stock) market.").

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the At-Issue Stocks posted some of the lowest cumulative residual returns among all NYSE- and Nasdaq-listed stocks during the proposed Class Period.

Figure D-5: Cumulative Residual Returns of At-Issue Stocks Relative to Contemporaneous Performance of NYSE/Nasdaq Stocks, 1/28/21 – 2/4/21

At-Issue Stock	Percentile Rank	Rank (Out of 4,232)	Cumulative Residual Return (1/28 – 2/4)
GameStop Corp.	0.0%	1st Lowest	-88%
Koss Corporation	0.0%	2nd Lowest	-71%
Express, Inc.	0.1%	3rd Lowest	-68%
AMC Entertainment Holdings, Inc.	0.1%	4th Lowest	-67%
BlackBerry Limited	0.1%	5th Lowest	-55%
Bed Bath & Beyond, Inc.	0.1%	6th Lowest	-54%
Nokia Corporation	0.4%	17th Lowest	-35%
trivago N.V.	0.6%	27th Lowest	-29%
Tootsie Roll Industries, Inc.	0.7%	31st Lowest	-27%

Source: *CRSP*; Refinitiv Eikon
Note: Residual returns are calculated using a one-factor model that regresses the daily returns of the stock on the returns of the S&P 500 Index during a 120-trading-day estimation period between 7/14/20 and 12/31/20. This analysis is limited to common stocks and ADRs listed on the NYSE and Nasdaq that have returns available every day for the entire 120-trading day estimation period and between 1/21/21 and 2/4/21. There are 4,232 stocks included in this analysis. The cumulative residual return is calculated as the product of (1 + daily residual return) minus 1 between 1/28/21 and 2/4/21.

Appendix E
Potentially Value-Relevant Information During the Run-Up Period 1/21/21 – 1/27/21

1. I have conducted an analysis to identify the total mix of new information in the market about the financial or business conditions of each of the nine At-Issue Stocks leading up to the proposed Class Period, including reviewing public press, analyst reports, company press releases, and SEC filings.[1] I found that the At-Issue Stocks had many statistically significant daily residual returns during the period between January 21, 2021 and January 27, 2021 for which I did not identify any new, potentially value-relevant information that could explain the stock price increases.[2] Out of the other days, I found very few that had new, potentially value-relevant information that was discussed by analyst reports.

2. For Express, GameStop, Koss, Tootsie Roll, and Trivago, I did not identify *any* new, potentially value-relevant company-specific information[3] on days with statistically significant residual stock returns during the period of price run-up between January 21 and January 27, 2021, despite these daily returns being highly unusual. During this period, these five companies experienced raw price increases as high as 480%. For AMC, Bed Bath & Beyond, BlackBerry, and Nokia, while I have identified certain company-specific information on certain days with statistically significant residual stock returns, my analysis of such information shows that the stock price run-up during this period cannot be explained by new, value-relevant information.

3. My discussion of potentially value-relevant[4] information does not include information about retail investors coordinating over social media, short squeezes, attempted short squeezes, or short-sale constraints, which, as I explained, are unrelated to the financial conditions or

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[1] To assess new, potentially value-relevant information, I considered (i) press releases issued by the at-issue companies; (ii) at-issue company SEC filings including Form 10-Ks, 10-Qs, 20-Fs, 8-Ks, 6-Ks, 4s, 13Ds, and 13Gs; (iii) equity analyst reports for the at-issue companies; and (iv) debt rating changes for the at-issue companies.

[2] See **Appendix D** for a description of my regression. See **Figures 4, 6, and 7** for cumulative, raw, and residual returns for the at-issue stocks referenced in this appendix.

[3] When I use the term "value-relevant information," I am referring to public, value-relevant information. As I discuss above, I understand that prices in a semi-strong form efficient market always fully reflect all publicly available information. See **Section VI.A** above.

[4] I use the term "value-relevant" to refer to "company-specific value-relevant" information about a company's financial or business conditions.

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business prospects of the companies.[5] The notion that retail investors' coordinated trading, short squeezes, attempted short squeezes, or short-sale constraints caused stock prices to move in a statistically significant manner would be inconsistent with market efficiency.[6] Below I discuss each of the At-Issue Stocks in turn. Based on the analysis below, together with **Appendix F**, I find that new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the span of two weeks leading up to and during the proposed Class period.

I. AMC

4. In the week leading up to the proposed Class Period, AMC's cumulative return was 570%. During this time period, AMC had four consecutive statistically significant daily positive residual returns, ranging from 14% to 21% between January 22, 2021 and January 26, 2021, and 298% on January 27, 2021.

5. On January 22, 2021, AMC had a statistically significant residual return of 15%.[7] The prior evening, after market close, S&P lowered AMC's debt rating to "Selective Default" from "CC."[8]

6. On January 25, 2021, AMC had a statistically significant residual return of 21%.[9] On the morning of January 25, 2021, AMC announced in a press release that since December 14, 2020,

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[5] This includes analyst rating changes and price target changes attributed to concerns over retail investor coordination over social media, short squeezes, attempted short squeezes, short-sale constraints, and the price run-up.
[6] See **Section VI** above.
[7] AMC had a raw return on January 22, 2021 of 17.8%, which was higher than 99.3% of stocks listed on the NYSE and Nasdaq.
[8] "S&PGR Downgrades AMC Entertainment Holdings Inc. To 'SD'," *Dow Jones Institutional News*, January 21, 2021, 6:22PM.
[9] AMC had a raw return on January 25, 2021 of 25.9%, which was higher than 99.5% of stocks listed on the NYSE and Nasdaq.

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Potentially Value-Relevant Information During the Run-Up Period 1/21/21 – 1/27/21

it had raised $917 million of new equity and debt, which AMC stated took "imminent bankruptcy … completely off the table."[10] That same morning, AMC also filed an 8-K announcing that it had entered into an agreement to sell up to 50 million shares of common stock in an "at-the-money" offering program.[11, 12, 13] This program was reportedly completed as of January 27, 2021.[14]

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[10] "AMC ... announced today that since December 14, 2020, it has successfully raised or signed commitment letters to receive $917 million of new equity and debt capital. This increased liquidity should allow the company to make it through this dark coronavirus-impacted winter. Of this $917 million in much-welcomed monies, AMC has raised $506 million of equity, from the issuance of 164.7 million new common shares, along with the previously announced securing of $100 million of additional first-lien debt and the concurrent issuance of 22 million new common shares to convert $100 million of second-lien debt into equity. In addition, the Company has executed commitment letters for $411 million of incremental debt capital in place through mid-2023, unless repaid before then, through the upsizing and refinancing of its European revolving credit facility. ... Based on a variety of assumptions, including future attendance levels, the Company estimates that its financial runway has been extended deep into 2021. ... AMC['s] CEO and President, said … 'This means that any talk of an imminent bankruptcy for AMC is completely off the table'" ("Press Release: AMC Raises $917 Million of Fresh Investment Capital Since Mid-December of 2020," *Dow Jones Institutional News*, January 25, 2021, 6:35AM). AMC filed a prospectus on December 11, 2020, stating that AMC "may offer and sell from time to time, in one or more series or issuances and on terms that we will determine at the time of the offering, up to 178,021,978 shares of our Class A common stock" (AMC Entertainment Holdings, Inc., Prospectus, filed December 11, 2020).

[11] "The Company proposes to issue and sell through or to the Managers, as sales agent and/or principal, up to 50,000,000 shares (the 'Shares') of the Company's Class A common stock, $0.01 par value ('Common Stock'), from time to time during the term of this Agreement and on the terms set forth in Section 3 of this Agreement" (AMC Entertainment Holdings, Inc., Form 8-K Exhibit 1.1, filed January 25, 2021, 6:35AM; AMC Entertainment Holdings, Inc., Prospectus Supplement, filed January 25, 2021, 8:21AM). The prospectus supplement stated that it was a supplement to a Form S-3 registration statement dated December 30, 2020 (AMC Entertainment Holdings, Inc., Form S-3, filed December 30, 2020).

[12] In the same 8-K, AMC stated that due to COVID-19, it was only operating in 438 out of 593 theaters in the U.S. and 86 out of 360 theaters internationally, with overall attendance down 92.3% and 88.6% year-over-year, respectively (AMC Entertainment Holdings, Inc., Form 8-K, filed January 25, 2021). A Credit Suisse analyst report reiterated this information, but did not provide an opinion on if this was a positive, negative, or expected development ("AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021, p. 1).

[13] In the same 8-K, AMC stated that due to its liquidity challenges, it had entered into landlord negotiations, and had "ceased to make rent payments under a substantial portion of our leases and have received notices of default, the result of which may permit landlord to threaten or seek potential remedies, including termination of leases, acceleration of obligations or involuntary insolvency proceedings" (AMC Entertainment Holdings, Inc., Form 8-K, filed January 25, 2021). The Credit Suisse, Loop, and MKM Partners analyst reports reiterated this information, but did not provide an opinion on the announcement ("AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021, p. 1; "Staves Off Bankruptcy but Massive Share Dilution," *Loop Capital Markets*, January 26, 2021, p.1; "Downgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021, p. 1).

[14] "AMC ... announced today that it has completed its previously announced at-the-market equity program. In its 8-K filing with the U.S. Securities and Exchange Commission on January 25, 2021, AMC announced entry into an equity distribution agreement with respect to an additional at-the-market equity program relating to 50 million shares of its

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7. Relief from bankruptcy can be good news; however, announcing secondary stock offerings generally results in stock price *decreases*, as the offerings tend to signal that the management sees the stock price as "overvalued." For example, Brealey et al. (2011) explains that in the United States, stock prices fall 3% on average after a seasoned offering (i.e., public offering of additional shares of an already-listed company).[15] Additionally, Walker and Yost (2008) finds that seasoned issues of common stock generally result in negative stock price reactions.[16, 17]

8. On January 26, 2021, AMC had a statistically significant residual return of 14%.[18] The prior evening, after market close, S&P raised AMC's debt rating to "CCC-" from "Selective Default," stating, "recent capital raises have improved AMC's near-term liquidity."[19] However, the financing transactions discussed by the rating agency had been previously known, and the academic literature has found that rating upgrades are generally associated with muted stock price reactions.[20] Therefore, the statistically significant residual return of 14% on this day is not

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Class A common stock. That program has now been completed" ("Press Release: AMC Completes At the Market Equity Program," *Dow Jones Institutional News*, January 27, 2021, 12:08PM).

[15] "Economists who have studied seasoned issues of common stock have generally found that announcement of the issue results in a decline in the stock price. For industrial issues in the United States this decline amounts to about 3%. While this may not sound overwhelming, the fall in market value is equivalent, on average, to nearly a third of the new money raised by the issue" (Brealey et al. (2011), p. 378).

[16] M. Walker and K. Yost (2007), "Seasoned equity offerings: What firms say, do, and how the market reacts," *Journal of Corporate Finance*, 14, pp. 376–386 at p. 382 ("We find the average two-day abnormal announcement return for the overall sample to be -2.76%, which is similar to previous findings on SEOs.").

[17] Additionally, Brealey et al. (2011) explains that if a company knows its stock is overvalued, the company may be incentivized to issue new shares at the inflated stock prices. This would provide the company with additional capital to benefit existing shareholders (who received more capital than should have been received based on the company's true value) at the expense of new shareholders (who overpaid for the stock) (Brealey et al. (2011), pp. 379–380). Consistent with this theory, if AMC knew its stock was overvalued, it would be incentivized to issue shares, which it did in an "at-the-market" offering program between January 25, 2021 and January 27, 2021.

[18] AMC had a raw return on January 26, 2021 of 12.2%, which was higher than 97.9% of stocks listed on the NYSE and Nasdaq.

[19] "S&PGR Raises AMC Entertainment Rtg To 'CCC-'; Otlk Negative," *Dow Jones Institutional News*, January 25, 2021, 9:30PM.

[20] See e.g., S. Chava, R. Ganduri, and C. Ornthanalai (2019), "Do credit default swaps mitigate the impact of credit rating downgrades?," *Review of Finance*, 23(3), pp. 471–511 ("Chava et al. (2019)") at p. 480 ("We also conduct our analysis for credit rating upgrade announcements. As in prior studies, we do not find a significant market reaction to credit rating upgrades…"). See also J. Hand, R. Holthausen, and R. Leftwich (1992), "The Effect of Bond Rating

consistent with the return one would expect to observe in an efficient market based on the academic literature's finding that credit rating upgrades are not associated with a significant market reaction.[21]

9. On January 27, 2021, AMC had a statistically significant residual return of 298%.[22] AMC's market value increased on this day by $4.3 billion (before accounting for shares issued in the equity offering completed on January 27, 2021).[23] On this day at 12:08PM, AMC announced in a press release that it had completed its previously announced stock offering, raising proceeds of $305 million.[24] However, as I show in **Exhibit 12**, the majority of AMC's stock price increase on January 27, 2021 occurred before the press release was issued, with AMC's stock price increasing 181% by 12:07PM on January 27, 2021 from the prior day's close.[25] Therefore, most of the stock price increase on this day occurred prior to the potentially value-relevant information being revealed.

10. Furthermore, as I discuss above, academic literature finds that secondary stock offerings are typically associated with small stock price *decreases* averaging 3%, not increases.[26] Finally, securities analysts did not attribute the "spike" in AMC's stock price to the equity issuance

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Agency Announcements on Bond and Stock Prices," *Journal of Finance*, 47(2), pp. 733–752 ("Hand et al. (1992)") at p. 734.

[21] On January 26, 2021, the Credit Suisse and Loop analysts reiterated the information in the equity and debt issuance announcement. The Loop analyst reiterated its sell rating and price target, and lowered its EPS and revenue forecast without providing an explanation for the change ("Staves Off Bankruptcy but Massive Share Dilution," *Loop Capital Markets*, January 26, 2021, p. 1). The Credit Suisse analyst reiterated its price target and maintained the same revenue and EBITDA forecasts ("AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021, p. 1; *Capital IQ*; **Exhibit 8**). A forecast is inconsistent with information that would explain the stock price increase on this day.

[22] AMC had a raw return on January 27, 2021 of 301.2%, which was higher than 100.0% of stocks listed on the NYSE and Nasdaq.

[23] Prior to the completion of the at-the-money equity offering, AMC had 287 million shares outstanding ("4Q Preview and Balance Sheet Update," *Credit Suisse*, March 3, 2021, p. 3). The market value of the 287 million shares increased from $1.4 billion to $5.7 billion (*CRSP*).

[24] "Press Release: AMC Completes At the Market Equity Program," *Dow Jones Institutional News*, January 27, 2021, 12:08PM. As I discuss above, AMC had already stated that imminent bankruptcy was off the table prior to January 27, 2021 (see ¶ 6 above).

[25] AMC's stock increased from a closing price of $4.96 on January 26, 2021 to $19.90 on January 27, 2021. As of 12:07PM, AMC's stock price was $13.96 (*Tick Data; CRSP*).

[26] See ¶ 7 above.

whose completion was announced on January 27, 2021. Instead, an MKM Partners analyst report stated that the stock price "spike" was caused by "WallStreetBets" traders whose trading had "decoupled AMC's share price and its valuation." In fact, MKM Partners lowered its price target for AMC from $2.00 to $1.00 due in part to "the recent liquidity events."[27]

II. Bed Bath & Beyond

11. In the week leading up to the proposed Class Period, Bed Bath & Beyond's cumulative return was 112%. During this time period, Bed Bath & Beyond had three statistically significant positive daily residual returns in the span of five trading days, ranging from 11% to 49%, on January 22, 26, and 27, 2021.

12. On January 21, 2021, Bed Bath & Beyond had a residual return of 5%, which was not statistically significant.[28] During market hours, Jefferies issued an analyst report that raised the price target from $20 to $24 based on a "review" of its "model" and a higher multiple "to reflect improving investor sentiment on value names across Hardlines Retail."[29]

13. On January 22, 2021, Bed Bath & Beyond had a statistically significant residual return of 11%.[30] I did not identify any new, potentially value-relevant information on that day.

14. On January 25, 2021, Bed Bath & Beyond had a residual return of 1%, which was not statistically significant.[31] In the morning of that day, a Loop Capital analyst report provided a product pricing study, stating that the gap between Bed Bath & Beyond's prices to Amazon's

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[27] "Downgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021, p. 1.
[28] Bed Bath & Beyond had a raw return on January 21, 2021 of 7.6%, which was higher than 96.8% of stocks listed on the NYSE and Nasdaq.
[29] "Model Update," *Jefferies*, January 21, 2021, p. 1. According to Capital IQ, this analyst report was available at 1:38PM on January 21, 2021 (*Capital IQ*).
[30] Bed Bath & Beyond had a raw return on January 22, 2021 of 12.4%, which was higher than 98.5% of stocks listed on the NYSE and Nasdaq.
[31] Bed Bath & Beyond had a raw return on January 25, 2021 of 1.6%, which was higher than 76.7% of stocks listed on the NYSE and Nasdaq.

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prices was narrowing, which the analyst said was encouraging. While the analyst increased the price target from $18 to $30, the analyst specifically stated that the raise was "primarily to reflect burgeoning retail investor interest in heavily shorted stocks."[32] Additionally, product pricing is public information.

15. On January 26, 2021, Bed Bath & Beyond had a statistically significant residual return of 21%.[33] I did not identify any new, potentially value-relevant information on that day.[34]

16. On January 27, 2021, Bed Bath & Beyond had a statistically significant residual return of 49%,[35] with an increase in market capitalization of nearly $2 billion.[36] Bed Bath & Beyond's raw stock return of 43% on this day was the largest stock price increase the company experienced in nearly three decades.[37] The only new, potentially value-relevant information I identified on this day was a Wedbush analyst report referencing commercially available,[38] third-party data on Bed Bath & Beyond's January store traffic, stating that it showed improvement.[39] First, the data are publicly available for purchase and it is unclear if Wedbush's conclusion was based on data that

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[32] The Loop analyst report stated, "We have updated our periodic pricing study for Bed Bath & Beyond (BBBY) in which we compare the company's prices to Amazon's. The price gap between BBBY and Amazon dropped to an all-time low for the second consecutive time. We are encouraged by BBBY's continually narrowing price gap with Amazon…" ("Raising Price Target As 'The Markets Can Remain Irrational Longer Than You Can Remain Solvent'," *Loop Capital Markets*, January 25, 2021, p. 1). According to Capital IQ, this analyst report was available at 5:02AM on January 25, 2021 (*Capital IQ*).

[33] Bed Bath & Beyond had a raw return on January 26, 2021 of 20.2%, which was higher than 99.1% of stocks listed on the NYSE and Nasdaq.

[34] A UBS report released after market close on January 25, 2021 downgraded Bed Bath & Beyond citing the 73% year-to-date stock price increase, while maintaining the same price target and lowering the FY22 and FY23 EPS estimates 2% and 5%, respectively, without specifying a reason ("Stepping Back and Sitting Down – Downgrade to Sell," *UBS*, January 25, 2021, p. 1). While the timestamp was not specified, the report referenced the closing stock price on January 25, 2021. A downgrade based on the stock price run-up and a lowered EPS forecast is inconsistent with information that would explain the stock price increase on this day.

[35] Bed Bath & Beyond had a raw return on January 27, 2021 of 43.5%, which was higher than 99.7% of stocks listed on the NYSE and Nasdaq.

[36] Bed Bath and Beyond's market capitalization increased from $4.5 billion on January 26, 2021 to $6.4 billion on January 27, 2021 (*CRSP*).

[37] Bed Bath & Beyond's stock price data became available through CRSP on June 5, 1992 (*CRSP*).

[38] "Placer," *Placer.ai*, available at https://www.placer.ai/.

[39] The Wedbush analyst report stated, "[D]ata from placer.ai indicates that BBBY's store traffic growth has materially improved in January, coinciding with the distribution of $600 fiscal stimulus checks" ("Downgrade to NEUTRAL; Opportunity Remains but Stock Is Ahead of Itself," *Wedbush*, January 27, 2021, pp. 1–2). According to Capital IQ, this analyst report was available at 6:40AM on January 27, 2021 (*Capital IQ)*.

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were unavailable to the market before January 27, 2021. Second, the analysts *downgraded* the stock in the report titled "Downgrade to NEUTRAL: Opportunity Remains but Stock is Ahead of Itself," stating, "the stock is ahead of itself and the sharp move higher is unsustainable."[40]

III. BlackBerry

17. In the week leading up to the proposed Class Period, BlackBerry's cumulative return was 96%. During this time period, BlackBerry had three statistically significant positive daily residual returns in the span of four trading days, ranging from 9% to 35%, on January 22, 25, and 27, 2021.

18. On January 22, 2021, BlackBerry had a statistically significant residual return of 9%.[41] On January 21, 2021 after market close, three Form 4s were filed by BlackBerry insiders indicating that they sold shares in the company.[42] Academic research shows that insiders are incentivized to sell their company stock when they believe that the stock price is overvalued.[43] Additionally, according to Lakonishok and Lee (2001), insider sales are typically associated with small, negative price movements.[44] Therefore, these Form 4 filings are inconsistent with information that would explain the stock price increase on this day.

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[40] "We continue to see high potential for BBBY's transformation, but believe the stock is ahead of itself and the sharp move higher is unsustainable" ("Downgrade to NEUTRAL; Opportunity Remains but Stock Is Ahead of Itself," *Wedbush*, January 27, 2021, p. 1).

[41] BlackBerry had a raw return on January 22, 2021 of 9.3%, which was higher than 97.5% of stocks listed on the NYSE and Nasdaq.

[42] EDGAR.

[43] Brealey et al. (2011) explains that if a company knows its stock is overvalued, it may be incentivized to issue new shares at the inflated stock prices (Brealey et al. (2011), pp. 379–380). Insiders of the company could have the same incentive to sell shares when the stock is overvalued, so a sale would be associated with a negative signal to the market, not a positive one.

[44] According to Lakonishok and Lee (2001), insider sales are typically associated with a small, not economically meaningful price decline of 0.23%. See J. Lakonishok and I. Lee (2001), "Are Insider Trades Informative?" *Review of Financial Studies*, 14(1), pp. 79–111 ("Lakonishok and Lee (2001)"), pp. 82, 90.

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19. On January 25, 2021, BlackBerry had a statistically significant residual return of 28%.[45] I did not identify any new, potentially value-relevant information on that day.

20. On January 26, 2021, BlackBerry had a residual return of 5%, which was not statistically significant.[46] After market close on January 25, 2021, BlackBerry announced an extended partnership with Baidu to use a BlackBerry map product in new electric vehicles from Guangzhou Automobile Group, stating the company "today announced an expansion of its strategic partnership with Baidu."[47]

21. On January 27, 2021, BlackBerry had a statistically significant residual return of 35%.[48] I did not identify any new, potentially value-relevant information on that day.

IV. Express

22. In the week leading up to the proposed Class Period, Express's cumulative return was 723%. During this time period, Express had four statistically significant daily residual returns, ranging from -23% to 220%. I did not identify any new, potentially value-relevant information for Express between January 21, 2021 and January 27, 2021.[49]

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[45] BlackBerry had a raw return on January 25, 2021 of 28.4%, which was higher than 99.6% of stocks listed on the NYSE and Nasdaq.

[46] BlackBerry had a raw return on January 26, 2021 of 4.9%, which was higher than 92.6% of stocks listed on the NYSE and Nasdaq.

[47] A BlackBerry press release announced "an expansion of its strategic partnership with Baidu, whose high-definition maps will run on the QNX(R) Neutrino(R) Real-time Operating System (RTOS) and will be mass-produced in the forthcoming GAC New Energy Aion models from the EV arm of GAC Group (Guangzhou Automobile Group Co., Ltd.)" ("BlackBerry Expands Partnership with Baidu to Power Next Generation Autonomous Driving Technology," *Dow Jones Institutional News*, January 25, 2021, 9:00PM).

[48] BlackBerry had a raw return on January 27, 2021 of 32.7%, which was higher than 99.5% of stocks listed on the NYSE and Nasdaq.

[49] On January 25, 2021, Wedbush issued an analyst report that lowered the Q4 FY20 EPS forecast, but reiterated the price target and kept their FY21 EPS forecast unchanged from their prior report ("Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush*, January 25, 2021, p. 1; "Covid Consumer Spending Trends Pause an Express Recovery for Now," *Wedbush*, December 4, 2020, p. 1). A lowered EPS forecast for one quarter is inconsistent with information that would explain the stock price increase on this day.

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V. GameStop

23. In the week leading up to the proposed Class Period, GameStop's cumulative return was 788%. During this time period, GameStop had four statistically significant positive daily residual returns ranging from 17% to 139%. I did not identify any new, potentially value-relevant information for GameStop between January 21, 2021 and January 27, 2021.

VI. Koss

24. In the week leading up to the proposed Class Period, Koss's cumulative return was 1,591%. During this time period, Koss had three statistically significant positive daily residual returns ranging from 66% to 480%. I did not identify any new, potentially value-relevant information for Koss between January 21, 2021 and January 27, 2021.

VII. Nokia

25. In the week leading up to the proposed Class Period, Nokia's cumulative return was 56%. During this time period, Nokia had two statistically significant positive daily residual returns in the span of three days, with a 15% residual return on January 25, 2021 and a 39% residual return on January 27, 2021.

26. On January 20, 2021, Nokia had a residual return of 2%, which was not statistically significant.[50] On January 21, 2021, Nokia had a residual return of 1%, which was not statistically significant.[51] On January 22, 2021, Nokia had a residual return of 0%, which was not statistically

[50] Note that I discuss the residual return and company-specific information on January 20, 2021 to contextualize the price movements and information releases from January 20, 2021 to January 22, 2021.
[51] Nokia had a raw return on January 21, 2021 of 0.5%, which was higher than 70.5% of stocks listed on the NYSE and Nasdaq.

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significant.[52] Nokia frequently provided press releases updating the market on its product deployments, with a total of 246 releases issued in 2021, or roughly one every business day.[53] On January 20, 2021 and January 21, 2021, Nokia issued a number of press releases discussing a successful pilot of 4G and 5G fixed wireless access network slicing,[54] the launch of 5G services at Optus Stadium in Australia for use by visitors to the stadium,[55] and a trial with China Mobile for an AI-powered radio access network.[56] While the press releases did not include a timestamp, the stock returns on January 20, 2021 through January 22, 2021 were not statistically significant.

27. On January 25, 2021, Nokia had a statistically significant residual return of 15%.[57] The SEB analyst increased Nokia's price target on January 25, 2021 by 9% due to "sector rerating," but did not explain what the motivation for the sector rerating was.[58]

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[52] Nokia had a raw return on January 22, 2021 of -0.5%, which was lower than 68.6% of stocks listed on the NYSE and Nasdaq.

[53] "Press and stock exchange releases," *Nokia*, available at https://www.nokia.com/about-us/newsroom/press-and-stock-exchange-releases/.

[54] "Nokia today announced that it has successfully piloted 4G and 5G fixed wireless access (FWA) network slicing with Saudi Arabian telecommunications services provider, Mobily on their live commercial network – the first sliced FWA deployment in the world. The ongoing pilot, which took place in the capital city of Riyadh, occurred in a multi-vendor environment and included sliced access, transport and core networks with management and assurance capabilities. The solution will allow Mobily to offer new FWA services to priority consumer and enterprise customers. It also enables slicing per application including voice, data, online gaming or home office applications" ("Nokia and Mobily pilot world's first 4G and 5G Fixed Wireless Access Network Slicing," Nokia Press Release, January 20, 2021, available at https://www.nokia.com/about-us/news/releases/2021/01/20/nokia-and-mobily-pilot-worlds-first-4g-and-5g-fixed-wireless-access-network-slicing/).

[55] "Nokia today announced that it has launched 5G services with mobile operator, Optus at the Optus Stadium in Perth, Australia. The move provides visitors attending sporting or music events with access to incredibly fast indoor and outdoor 5G coverage with speeds over 1Gbps. Nokia has supported Optus with the deployment of the technology as well as its ambitious goals for 5G" ("Nokia launches 5G experience at Optus Stadium in Australia," Nokia Press Release, January 21, 2021, available at https://www.nokia.com/about-us/news/releases/2021/01/20/nokia-launches-5g-experience-at-optus-stadium-in-australia/).

[56] "Nokia and China Mobile (CMCC) today announced that they have successfully completed live trials of an AI-powered radio access network (RAN) over CMCC's network. Utilizing CMCC's 4G and 5G networks, the companies completed an AI-based real-time user equipment (UE) traffic bandwidth forecast trial in Shanghai as well as a network anomaly detection trial in Taiyuan, the capital city of China's Shanxi province" ("Nokia and CMCC trial AI-powered radio access on live 5G network," Nokia Press Release, January 21, 2021, available at https://www.nokia.com/about-us/news/releases/2021/01/21/nokia-and-cmcc-trial-ai-powered-radio-access-on-live-5g-network/).

[57] Nokia had a raw return on January 25, 2021 of 15.5%, which was higher than 98.2% of stocks listed on the NYSE and Nasdaq.

[58] The SEB analyst report stated, "Our 20 20 -22E EPS is trimmed 1-2% on FX but our target price is upped from EUR 3.5 to EUR 3.8 on sector rerating" ("Preset expectations for 2021," *SEB*, January 25, 2021, p. 1).

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28. On January 26, 2021, Nokia had a residual return of -2%, which was not statistically significant.[59] On the morning of that day, Nokia issued a press release announcing the timeline for its enhanced C-Band portfolio.[60]

29. On January 27, 2021, Nokia had a statistically significant residual return of 39%,[61] with an increase in market capitalization of over $1 billion.[62] On January 26, 2021, after market close, Nokia issued another press release announcing that an Algerian company had deployed Nokia software.[63] Additionally, on January 27, 2021, Nokia issued a press release announcing the roll out of a 1 terabit "clear-channel interface deployment" with Elisa, a Finnish telecommunications company.[64] Nokia's 38% raw return on January 27, 2021 was over three times larger than the next largest stock return Nokia experienced at any time in 2020, and the largest return it had experienced in over two decades.[65] Despite the large stock price increase, I did not see any analyst reports that commented on the press releases, that updated their forecasts based on this

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[59] Nokia had a raw return on January 26, 2021 of -2.5%, which was lower than 75.2% of stocks listed on the NYSE and Nasdaq.

[60] The press release stated, "Nokia today announced that its enhanced C-Band portfolio will be available from Q1 2021 to support mobile operators' 5G network deployments, following the conclusion of the recent spectrum auction in the U.S. Nokia's comprehensive C-Band portfolio, which covers both indoor and outdoor deployment needs, includes massive MIMO antenna solutions, hybrid antennas that combine both passive and active radio platforms into a single, modular unit, macro remote radio heads and small cell solutions to cover all connectivity and deployment requirements" ("Nokia's comprehensive C-Band portfolio ready for 5G build-out in U.S.," *Dow Jones Institutional News*, January 26, 2021, 4:00AM ET).

[61] Nokia had a raw return on January 27, 2021 of 38.5%, which was higher than 99.6% of stocks listed on the NYSE and Nasdaq.

[62] Nokia's market capitalization increased from $3.1 billion on January 26, 2021 to $4.3 billion on January 27, 2021 (*CRSP)*.

[63] The press release stated, "Ooredoo Algeria has deployed Nokia's cloud-native Core software to cost effectively strengthen its network performance and reliability, and to strategically position itself for the future and the launch of new services to meet customer needs. This deployment will further improve the digital ecosystem of the country" ("Ooredoo Algeria deploys Nokia's cloud-native core software to prepare for the future," *Dow Jones Institutional News*, January 26, 2021, 9:00PM).

[64] The press release stated, "Nokia today announced it has achieved a major network capacity milestone with its long-standing partner Elisa while preparing the operator's network for the future. Through a live commercial trial, the companies are proving the world's first 1T (terabit) clear-channel interface deployment to efficiently scale Elisa's network to support new applications and access technologies" ("Nokia and Elisa push network boundaries with world's first 1T deployment," Nokia Press Release, January 27, 2021, available at https://www.nokia.com/about-us/news/releases/2021/01/27/nokia-and-elisa-push-network-boundaries-with-worlds-first-1t-deployment/).

[65] *CRSP*. Nokia's stock price data became available through CRSP on July 1, 1994.

information, or that attributed the 39% residual return to this information. Furthermore, on January 27, 2021, Nokia itself addressed the price volatility of its stock, stating that the company was "not aware of any material, undisclosed corporate developments or material change in its business or affairs that has not been publicly disclosed that would account for the recent increase in the market price or trading volume of its shares."[66]

VIII. Tootsie Roll

30. In the week leading up to the proposed Class Period, Tootsie Roll's cumulative return was 44%. During this time period, Tootsie Roll had three statistically significant positive daily residual returns ranging from 9% to 14%. I did not identify any new, potentially value-relevant information between January 21, 2021 and January 27, 2021.

IX. Trivago

31. In the week leading up to the proposed Class Period, Trivago's cumulative return was 51%. During this time period, Trivago had one statistically significant positive daily residual return of 54% on January 27, 2021.

32. On January 22, 2021, Trivago had a residual return of 2%, which was not statistically significant.[67] The prior day after market close, a Truist Securities analyst report lowered its estimates to "reflect a higher than anticipated hit from the pandemic on travel in 4Q20 and 1Q21," but the analyst maintained the same price target.[68]

33. On January 27, 2021, Trivago had a statistically significant residual return of 54%.[69] I did not identify any new, potentially value-relevant information on that day.

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[66] Nokia Corporation, Form 6-K, filed January 27, 2021.
[67] Trivago had a raw return on January 22, 2021 of 0.5%, which was higher than 50.8% of stocks listed on the NYSE and Nasdaq.
[68] "Revising 4Q/1Q Ests Lower to Reflect Pandemic Impact; Hold," *Truist Securities*, January 21, 2021, p. 1.
[69] Trivago had a raw return on January 27, 2021 of 51.9%, which was higher than 99.8% of stocks listed on the NYSE and Nasdaq.

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1. I have conducted an analysis to identify the total mix of new information in the market about the financial or business conditions of each of the nine At-Issue Stocks during the proposed Class Period, including reviewing public press, analyst reports, company press releases, and SEC filings.[1] I found that the At-Issue Stocks had many statistically significant daily residual returns during the proposed Class Period for which I did not identify any new, potentially value-relevant information that could explain the stock price movements.[2] Out of the other days, I found very few that had new, potentially value-relevant information that was discussed by analyst reports.

2. For BlackBerry, Express, GameStop, Tootsie Roll, and Trivago, I did not identify *any* new, potentially value-relevant company-specific information[3] on days with statistically significant residual stock returns during the proposed Class Period, despite these returns being highly unusual. During the proposed Class Period, these five companies experienced daily raw price increases as large as 67.9% and daily raw price declines as large as 60.0%. For AMC, Bed Bath & Beyond, Koss, and Nokia, while I have identified company-specific information on certain days with statistically significant residual stock returns, my analysis of such information shows that the large price movement over this period cannot be explained by new, value-relevant information.

3. Similar to the discussion of the potentially value-relevant[4] information during the period leading up to the proposed Class Period, I do not include information about retail investors

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[1] To assess new, potentially value-relevant information, I considered (i) press releases issued by the at-issue companies; (ii) at-issue company SEC filings including Form 10-Ks, 10-Qs, 20-Fs, 8-Ks, 6-Ks, 4s, 13Ds, and 13Gs; (iii) equity analyst reports for the at-issue companies; and (iv) debt rating changes for the at-issue companies.

[2] See **Appendix D** for a description of my regression. See **Figures 5, 6, and 7** for cumulative, raw, and residual returns for the at-issue stocks referenced in this appendix.

[3] When I use the term "value-relevant information," I am referring to public, value-relevant information. As I discuss above, I understand that prices in a semi-strong form efficient market always fully reflect all publicly available information. See **Section VI.A** above.

[4] I use the term "value-relevant" to refer to "company-specific value-relevant" information about a company's financial or business conditions.

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coordinating over social media, short squeezes, attempted short squeezes, short-sale constraints, or retail trading restrictions,[5] as the notion that retail investors' coordinated trading, short squeezes, attempted short squeezes, or short-sale constraints caused stock prices to move in a statistically significant manner would be inconsistent with market efficiency.[6] Below I discuss each At-Issue Stock in turn. Based on the analysis below, together with **Appendix E**, I find that new information about the financial or business conditions of the nine at-issue companies cannot explain the large stock price run-up and subsequent reversal that the At-Issue Stocks collectively experienced over the span of two weeks leading up to and during the proposed Class period.

I. AMC

4. During the proposed Class Period, AMC's cumulative return was -64%. During this time period, AMC had statistically significant daily residual returns on five of the six trading days, ranging from -54% to 59%.

5. On January 28, 2021, AMC had a statistically significant residual return of -54%.[7] On the morning of January 28, 2021, AMC filed an 8-K stating that on January 27, 2021, Silver Lake (an investor in AMC) had converted $600 million in convertible notes into 44 million

[5] This includes analyst rating changes and price target changes attributed to concerns over retail investor coordination over social media, short squeezes, attempted short squeezes, short-sale constraints, and the price run-up.
[6] See **Section VI** above.
[7] AMC had a raw return on January 28, 2021 of -56.6%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.

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shares of Class A common stock,[8] or roughly 11% of shares outstanding.[9] The conversion rate had been previously set as of July 31, 2020.[10]

6. On January 29, 2021, AMC had a statistically significant residual return of 59%,[11] with an increase in market capitalization on this day of $1.8 billion.[12] That day, before market close, S&P raised AMC's debt rating, stating, "AMC has benefitted from the elevated demand for its equity shares over the past few months, which has allowed it to raise additional capital and improve its liquidity."[13] However, the financing transactions discussed by the rating agency had

[8] "On January 27, 2021, affiliates of Silver Lake Group, L.L.C. ('Silver Lake') and certain co-investors (collectively, the 'Noteholders') elected to convert (the 'Conversion') all $600.0 million of the Company's 2.95% Convertible Senior Secured Notes due 2026 into shares of the Company's Class A common stock at a conversion price of $13.51 per share. The Conversion is expected to settle on January 29, 2021 and will result in the issuance of 44,422,860 shares of the Company's Class A common stock to the Noteholders. The Conversion will also reduce the Company's first-lien indebtedness by $600.0 million" (AMC Entertainment Holdings, Inc., Form 8-K, filed January 28, 2021, 6:02AM).

[9] As of January 29, 2021, AMC had 395 million Class A shares outstanding ("4Q Preview and Balance Sheet Update," *Credit Suisse*, March 3, 2021 ("Credit Suisse March 2021 Analyst Report"), p. 3).

[10] "The Convertible Notes were initially convertible into an aggregate of 31,662,240 shares of Class A common stock and were issued in a transaction exempt from the registration requirements of the Securities Act. Due to an adjustment to the conversion price of the Convertible Notes that became effective as of September 14, 2020, the Convertible Notes are convertible into an aggregate of 44,422,860 shares of Class A common stock" (AMC Entertainment Holdings, Inc., Prospectus, filed October 1, 2020, p. 21).

[11] AMC had a raw return on January 29, 2021 of 53.7%, which was higher than 99.9% of stocks listed on the NYSE and Nasdaq.

[12] AMC had 395 million shares outstanding on January 29, 2021 following the Silver Lake conversion the prior day (Credit Suisse March 2021 Analyst Report, p. 3). AMC's stock price increased from $8.63 on January 28, 2021 to $13.26 on January 29, 2021 (*CRSP*).

[13] "…S&P Global Ratings today raised its issue-level rating on AMC Entertainment Holdings Inc.'s first-lien debt to 'CCC' from 'CCC-' and revised the recovery rating to '2' from '3'. The '2' recovery rating indicates our expectation for substantial recovery (70%-90%; rounded estimate: 75%) for lenders in the event of a payment default. AMC has benefitted from the elevated demand for its equity shares over the past few months, which has allowed it to raise additional capital and improve its liquidity. This culminated with the company's completion of its remaining at-the-market equity program authorization by raising an additional $305 million on Jan. 26, 2021. Additionally, Silverlake Group LLC elected to convert the $600 million of 2.95% first-lien secured convertible notes issued by AMC into equity, which settled on Jan. 29, 2021. This conversion reduced the amount of first-lien debt in the company's capital structure and improved the recovery prospects for its other first-lien lenders. As such, we raised our issue-level rating and revised our recovery rating on AMC's first-lien debt. These two events will provide AMC with additional near-term liquidity and slightly reduce its interest burden, though we believe its capital structure remains unsustainable. The company previously expected to have only enough liquidity to last until July 2021. The incremental $305 million will extend its runway and provide AMC with greater flexibility if its theater attendance recovers more slowly than it currently expects" ("S&PGR Raises AMC Entertainment Hldgs 1stLn Rtg To 'CCC' (RR:2)," *Dow Jones Institutional News*, January 29, 2021, 12:07PM).

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been previously known, and the academic literature has found that rating upgrades are generally associated with muted stock price reactions.[14]

7. On February 1, 2021, AMC had a residual return of -2%, which was not statistically significant.[15] After market close on the prior evening, a Schedule 13D and Form 4 were filed indicating that, following Silver Lake's debt-to-equity conversion on January 27, 2021, Silver Lake had exited its entire equity position in AMC that same day.[16] Additionally, on the morning of February 1, 2021, the MKM Partners analyst downgraded AMC's common stock, referencing concerns of share dilution, AMC's stock being decoupled from its valuation, and a lowered forecast for AMC based on an estimated decline in industry-wide domestic box office revenue.[17]

8. On February 2, 2021, AMC had a statistically significant residual return of -34%.[18] I did not identify any new, potentially value-relevant information on that day.

9. On February 3, 2021, AMC had a statistically significant residual return of 13%.[19] I did not identify any new, potentially value-relevant information on that day.

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[14] See, e.g., Chava et al. (2019), p. 480 ("We also conduct our analysis for credit rating upgrade announcements. As in prior studies, we do not find a significant market reaction to credit rating upgrades…"). See also Hand et al. (1992), p. 734.

[15] AMC had a raw return on February 1, 2021 of 0.3%, which was lower than 74.7% of stocks listed on the NYSE and Nasdaq.

[16] AMC Entertainment Holdings, Inc., Form 13D, filed January 29, 2021, 5:04PM; AMC Entertainment Holdings, Inc., Form 4, filed January 29, 2021, 5:10PM.

[17] "We are downgrading our rating for AMC to Sell from Neutral. In our view, the recent volatility and spike in the company's stock, thanks to the Reddit/WallStreetBets crowd, has decoupled AMC's share price and its valuation. Near-term prospects of bankruptcy have been avoided thanks to $1.2bn of fresh capital being raised since mid-December. However, equity shareholders have been diluted by roughly 75% over the last couple months and there is still approximately $5.7bn of debt, a total which is growing each quarter due to deferred interest payments which are tacked on to the principal balance. … Our 2021 revenue and adjusted EBITDA outlook is $2.51bn (+104%) and a loss of $495mn (versus an estimated loss of $1.01bn in 2020), respectively, down from our prior view of $4.136bn and +$331mn. These estimates are based on industry wide domestic box office revenue of $4.87bn (+133%), down from our previous outlook of $8.6bn" ("Downgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021, pp. 1, 2). According to Capital IQ, this analyst report was available at 5:34AM on February 1, 2021 (*Capital IQ*).

[18] AMC had a raw return on February 2, 2021 of -41.2%, which was lower than 99.9% of stocks listed on the NYSE and Nasdaq.

[19] AMC had a raw return on February 3, 2021 of 14.7%, which was higher than 98.3% of stocks listed on the NYSE and Nasdaq.

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10. On February 4, 2021, AMC had a statistically significant residual return of -20%.[20] I did not identify any new, potentially value-relevant information on that day.

II. Bed Bath & Beyond

11. During the proposed Class Period, Bed Bath & Beyond's cumulative return was -49%. During this time period, Bed Bath & Beyond had statistically significant daily residual returns on all six trading days, ranging from -40% to 9%.[21]

12. On January 28, 2021, Bed Bath & Beyond had a statistically significant residual return of -40%.[22] In the morning on this day, Telsey issued an analyst report downgrading the company, stating that the stock price had "gotten ahead of itself" and the increase "likely ha[d] been fueled by a short squeeze." Telsey lowered its EPS forecast for FY2021 and FY2022 due to "volatility related to the turnaround," but raised its price target.[23, 24]

13. On January 29, 2021, Bed Bath & Beyond had a statistically significant residual return of 9%.[25] I did not identify any new, potentially value-relevant information on that day.

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[20] AMC had a raw return on February 4, 2021 of -21.0%, which was lower than 99.9% of stocks listed on the NYSE and Nasdaq.

[21] January 29, 2021 and February 4, 2021 are not statistically significant when the S&P Retail Composite Index is selected as the industry index.

[22] Bed Bath & Beyond had a raw return on January 28, 2021 of -36.4%, which was lower than 99.9% of stocks listed on the NYSE and Nasdaq.

[23] "BBBY – Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021, pp. 1, 2. According to Capital IQ, this analyst report was available at 5:02AM on January 28, 2021 (*Capital IQ*).

[24] A BofA Securities report released on January 28, 2021 downgraded Bed Bath & Beyond citing "a significant increase in share price and valuation" with "no significant news specific to the company announced or change in consensus earnings, the increase in share price appears to be driven solely by a short squeeze … and high retail enthusiasm." The analyst report raised the price target based on a higher multiple due to "potential for upward revision to consensus estimates and in the near term current momentum should provide support" ("Still see a great turnaround taking shape but big price move takes us to Neutral," *BofA Securities*, January 28, 2021, p. 1). An increased price target is inconsistent with information that would explain the stock price decrease on this day.

[25] Bed Bath & Beyond had a raw return on January 29, 2021 of 5.0%, which was higher than 95.7% of stocks listed on the NYSE and Nasdaq.

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

14. On February 1, 2021, Bed Bath & Beyond had a statistically significant residual return of -14%.[26] I did not identify any new, potentially value-relevant information on that day.

15. On February 2, 2021, Bed Bath & Beyond had a statistically significant residual return of -20%,[27] with a decline in market capitalization of roughly $600 million.[28] After market close on February 1, 2021, Bed Bath & Beyond announced the completion of a previously announced $225 million share repurchase program, and an extended timeline for its $150 million share repurchase program due to "extreme market volatility" and a desire for "responsible stewardship of capital."[29] Academic literature has documented that share repurchases are often associated with positive stock price reactions around 2%, because they are a signal from the company that the stock price is undervalued.[30] Therefore, Bed Bath & Beyond's extension of the share repurchase program could be a signal to the market that its stock price was overvalued, which is consistent with the company's statement that due to "extreme market volatility" it was extending the program in order to maintain "responsible stewardship of capital."[31] Additionally, despite the

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[26] Bed Bath & Beyond had a raw return on February 1, 2021 of -14.4%, which was lower than 99.8% of stocks listed on the NYSE and Nasdaq.

[27] Bed Bath & Beyond had a raw return on February 2, 2021 of -16.1%, which was lower than 99.5% of stocks listed on the NYSE and Nasdaq.

[28] Bed Bath & Beyond's market capitalization decreased from $3.7 billion on February 1, 2021 to $3.1 billion on February 2, 2021 (*CRSP).*

[29] "Bed Bath & Beyond Inc. (Nasdaq: BBBY) announced today the successful completion of its initial $225 million accelerated share repurchase program which initiated on October 29, 2020. Under the agreement, a total of approximately 11 million shares of Bed Bath & Beyond common stock were repurchased at an average price of approximately $20.77. The Company also announced that, in consideration of recent stock market volatility, it has extended the maturity of its second accelerated share repurchase agreement for $150 million which initiated on January 11, 2021, to end no later than April 2021 instead of February 2021. Mark Tritton, President and Chief Executive Officer of Bed Bath & Beyond said, '…Our decision to amend the terms of our ongoing $150 million accelerated share repurchase agreement during this period of extreme market volatility reflects responsible stewardship of capital'" ("Bed Bath & Beyond Inc. Successfully Completes $225 Million Accelerated Share Repurchase Program Started In October 2020 >BBBY," *Dow Jones Institutional News*," February 1, 2021, 4:30PM).

[30] Bhattacharya and Jacobsen (2016) finds that the repurchase announcements are followed by an approximately 2% statistically significant abnormal return (U. Bhattacharya and S. Jacobsen (2016), "The Share Repurchase Announcement Puzzle: Theory and Evidence," *Review of Finance*, 20(2), pp. 725–758 at p. 751).

[31] "Bed Bath & Beyond Inc. Successfully Completes $225 Million Accelerated Share Repurchase Program Started In October 2020 >BBBY," *Dow Jones Institutional News*, February 1, 2021, 4:30PM.

large stock price decrease, I did not see any analyst reports update their forecasts based on this information or attribute the negative residual return to this information.

16. On February 3, 2021, Bed Bath & Beyond had a statistically significant residual return of 8%.[32] I did not identify any new, potentially value-relevant information on that day.

17. On February 4, 2021, Bed Bath & Beyond had a statistically significant residual return of -8%.[33] I did not identify any new, potentially value-relevant information on that day.

III. BlackBerry

18. During the proposed Class Period, BlackBerry's cumulative return was -52%. During this time period, BlackBerry had statistically significant daily residual returns on two of the days, with a residual return of -43% on January 28, 2021 and -23% on February 2, 2021. I did not identify any new, potentially value-relevant information during the proposed Class Period.

IV. Express

19. During the proposed Class Period, Express's cumulative return was -66%. During this time period, Express had four statistically significant daily residual returns ranging from -58% to 32%. I did not identify any new, potentially value-relevant information during the proposed Class Period.

[32] Bed Bath & Beyond had a raw return on February 3, 2021 of 10.4%, which was higher than 96.6% of stocks listed on the NYSE and Nasdaq.
[33] Bed Bath & Beyond had a raw return on February 4, 2021 of -3.6%, which was lower than 95.8% of stocks listed on the NYSE and Nasdaq.

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

V. GameStop

20. During the proposed Class Period, GameStop's cumulative return was -85%. During this time period, GameStop had statistically significant daily residual returns on five of the six trading days, ranging from -64% to 70%.

21. On January 28, 2021, GameStop had a statistically significant residual return of -47%.[34] I did not identify any new, potentially value-relevant information on that day.

22. On January 29, 2021, GameStop had a statistically significant residual return of 70%.[35] I did not identify any new, potentially value-relevant information on that day.

23. On February 1, 2021, GameStop had a statistically significant residual return of -34%.[36] I did not identify any new, potentially value-relevant information on that day.

24. On February 2, 2021, GameStop had a statistically significant residual return of -64%.[37] I did not identify any new, potentially value-relevant information on that day.

25. On February 3, 2021, GameStop had a residual return of 1%, which was not statistically significant.[38] On February 3, 2021, before market open, GameStop announced a newly created chief technology officer role as well as two other executive hires.[39] The following morning, a

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[34] GameStop had a raw return on January 28, 2021 of -44.3%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.
[35] GameStop had a raw return on January 29, 2021 of 67.9%, which was higher than 99.9% of stocks listed on the NYSE and Nasdaq.
[36] GameStop had a raw return on February 1, 2021 of -30.8%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.
[37] GameStop had a raw return on February 2, 2021 of -60.0%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.
[38] GameStop had a raw return on February 3, 2021 of 2.7%, which was higher than 76.6% of stocks listed on the NYSE and Nasdaq.
[39] "[GameStop] today announced that it has appointed Matt Francis to the newly-created role of Chief Technology Officer. Mr. Francis has a start date of February 15, 2021. … Additionally, the Company had made two other executive hires: Kelli Durkin, Senior Vice President of Customer Care … [and] Josh Krueger, Vice President of Fulfillment" ("Press Release: GameStop Appoints Chief Technology Officer," *Dow Jones Institutional News*, February 3, 2021, 9:00AM).

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

BofA Securities report stated that this news was "mixed" because it helped improve some aspects of the business, but not others.[40]

26. On February 4, 2021, GameStop had a statistically significant residual return of -46%.[41] I did not identify any new, potentially value-relevant information on that day.

VI. Koss

27. During the proposed Class Period, Koss's cumulative return was -68%. During this time period, Koss had statistically significant daily residual returns on all six trading days, ranging from -47% to 53%.

28. On January 28, 2021, Koss had a statistically significant residual return of -27%.[42] On January 27, 2021, after market close, two Form 4s were filed by Koss insiders indicating that they exercised options and sold shares in the company.[43] Academic research shows that insiders are incentivized to sell their company stock when they believe that the stock price is overvalued.[44] However, according to Lakonishok and Lee (2001), insider sales are not typically associated with large price movements.[45]

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[40] "When fundamentals still appear on the sidelines, what other factors matter," *BofA Securities*, February 4, 2021, 5:00AM, p. 3.
[41] GameStop had a raw return on February 4, 2021 of -42.1%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.
[42] Koss had a raw return on January 28, 2021 of -27.7%, which was lower than 99.7% of stocks listed on the NYSE and Nasdaq.
[43] Koss Corporation, Form 4 reported by Lenore Lillie, filed January 27, 2021; Koss Corporation, Form 4 reported by David Donnan Smith, filed January 27, 2021.
[44] Brealey et al. (2011) explains that if a company knows its stock is overvalued, it may be incentivized to issue new shares at the inflated stock prices (Brealey et al. (2011), pp. 379–380). Insiders of the company could have the same incentive to sell shares when the stock is overvalued.
[45] The study does "not observe any major stock price changes around the time inside trade or around reporting dates," stating "the abnormal returns around the reporting dates of insiders' trades are not economically meaningful" and "the abnormal returns are 0.13% and -0.23% for purchases and sales, respectively" (Lakonishok and Lee (2001), pp. 82, 90).

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

29. On January 29, 2021, Koss had a statistically significant residual return of 53%.[46] On the prior day, after market close, Koss announced its financial results.[47] However, Koss did not have analyst coverage, so analyst consensus cannot be used to determine if the results were a positive or negative surprise relative to the market's expectations. Additionally, the following morning (January 29, 2021), before market open, Koss filed a 10-Q.[48]

30. On February 1, 2021, Koss had a statistically significant residual return of -47%.[49] I did not identify any new, potentially value-relevant information on that day.

31. On February 2, 2021, Koss had a statistically significant residual return of -44%.[50] I did not identify any new, potentially value-relevant information on that day.

32. On February 3, 2021, Koss had a statistically significant residual return of 24%.[51] I did not identify any new, potentially value-relevant information on that day.

33. On February 4, 2021, Koss had a statistically significant residual return of -28%.[52] On February 3, 2021 after market close, a series of Form 4s were filed by Koss insiders indicating that they sold shares in the company.[53] Consistent with this, public press reported that nine

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[46] Koss had a raw return on January 29, 2021 of 52.5%, which was higher than 99.9% of stocks listed on the NYSE and Nasdaq.

[47] "[Koss], the U.S. based high-fidelity headphone company, has reported its second quarter results for the quarter ended December 31, 2020. Sales for the second quarter were $4,929,789, which is an 18.4% increase from sales of $4,162,659 for the same three month period one year ago. The three month net income was $508,890, compared to a net loss of $215,713 for the second quarter last year. Diluted and basic income per common share for the quarter was $0.07 compared to a loss per common share of $0.03 for the same three month period one year ago" ("Press Release: Koss Corp. Releases Second Quarter Results," *Dow Jones Institutional News*, January 28, 2021, 5:15PM).

[48] Koss Corporation, Form 10-Q for Q4 2020, filed January 29, 2021, 7:55AM.

[49] Koss had a raw return on February 1, 2021 of -45.3%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.

[50] Koss had a raw return on February 2, 2021 of -42.9%, which was lower than 100.0% of stocks listed on the NYSE and Nasdaq.

[51] Koss had a raw return on February 3, 2021 of 28.0%, which was higher than 99.7% of stocks listed on the NYSE and Nasdaq.

[52] Koss had a raw return on February 4, 2021 of -26.5%, which was lower than 99.9% of stocks listed on the NYSE and Nasdaq.

[53] Koss Corporation, Form 4 reported by John C. Koss Jr., filed February 3, 2021; Koss Corporation, Form 4 reported by David Donnan Smith, filed February 3, 2021; Koss Corporation, Form 4 reported by Steven A. Leveen, filed February 3, 2021; Koss Corporation, Form 4 reported by Thomas L. Doerr, filed February 3, 2021; Koss Corporation, Form 4 reported by William Jesse Sweasy, filed February 3, 2021; Koss Corporation, Form 4 reported by Theodore Nixon, filed February 3, 2021; Koss Corporation, Form 4 reported by Michael J. Koss, filed February 3,

insiders had sold more than $40 million of Koss's common stock "at prices between 8 and 15 times the company's end-of-year share price."[54] As mentioned above, academic research shows that insiders are incentivized to sell their company stock when they believe that the stock price is overvalued.[55] Therefore, if the insider sales contributed to the residual stock price decline of 28% on February 4, 2021, that is consistent with the market deeming the stock to be overvalued before this day.[56]

VII. Nokia

34. During the proposed Class Period, Nokia's cumulative return was -33%. During this time period, Nokia had statistically significant daily residual returns on four of the six trading days, ranging from -27% to 5%.

35. On January 28, 2021, Nokia had a statistically significant residual return of -27%.[57] I did not identify any new, potentially value-relevant information on that day.

2021; Koss Corporation, Form 4 reported by Lenore Lillie, filed February 3, 2021; Koss Corporation, Form 4 reported by Michael J. Koss Jr., filed February 3, 2021.

[54] "Nine insiders at headphone-maker Koss Corp. sold more than $40 million in shares as the company's stock price retreated from dramatic highs earlier this week. The sales on Monday and Tuesday -- by four directors and five executives, including three members of the founding Koss family -- came at prices between 8 and 15 times the company's end-of-year share price, according to data from InsiderScore, which analyzes stock transactions by corporate insiders" ("Koss Insiders Cash More Than $40 Million in Headphone Maker's Shares," *Dow Jones Institutional News*, February 4, 2021, 4:25PM).

[55] Brealey et al. (2011) explains that if a company knows its stock is overvalued, it may be incentivized to issue new shares at the inflated stock prices (Brealey et al. (2011), pp. 379–380). Insiders of the company could have the same incentive to sell shares when the stock is overvalued.

[56] As I discuss above, Lakonishok and Lee (2001) finds that "the abnormal returns are 0.13% and -0.23% for purchases and sales, respectively," which is much smaller than Koss's 28% decline. See ¶ 28 above.

[57] Nokia had a raw return on January 28, 2021 of -28.4%, which was lower than 99.7% of stocks listed on the NYSE and Nasdaq.

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

36. On January 29, 2021, Nokia had a residual return of -1%, which was not statistically significant.[58] As I discuss below, a DNB Markets analyst later raised its rating after Ericsson's financial report filed on January 29, 2021 had positive implications for Nokia.[59]

37. On February 1, 2021, Nokia had a statistically significant residual return of 5%.[60] On this day, before market open, the DNB Markets analyst raised its rating on Nokia due to the fact that the "share price has come down again following the retail-investor frenzy-driven gains of last week" and that Ericsson's financial report filed on January 29, 2021 had positive implications for Nokia.[61]

38. On February 2, 2021, Nokia had a statistically significant residual return of -8%.[62] Nokia frequently provided press releases updating the market on its product deployments, with a total of 246 releases issued in 2021, or roughly one every business day.[63] On February 1, 2021, after market close, Nokia announced a partnership with StarHub to "expedite standalone 5G services for Singapore customers."[64] Additionally, on February 2, 2021, before market open, Nokia

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[58] Nokia had a raw return on January 29, 2021 of -2.8%, which was lower than 69.1% of stocks listed on the NYSE and Nasdaq.

[59] See ¶ 37 below. Additionally, a JP Morgan analyst referenced the announcement, but maintained its price target ("Market looking for gross margin & FCF progress. We expect small beat on operating margin," *JP Morgan*, February 2, 2021, p. 1).

[60] Nokia had a raw return on February 1, 2021 of 7.2%, which was higher than 92.6% of stocks listed on the NYSE and Nasdaq.

[61] "Back to BUY (SELL); target price raised to EUR4.8 (4.0). There are four reasons for our recommendation upgrade to BUY after a brief stint at SELL: 1) the share price has come down again following the retail-investor frenzy-driven gains of last week; 2) the read-across from Ericsson's Q4 report on Friday suggests to us that there is considerable 5G cycle strength in north-east Asia (excluding China), where Nokia is also strong, and that the cloud core and software market is picking up. We have increased our Q4 forecasts accordingly and are now above consensus on operating profit (EUR980m, 3% above consensus); 3) we believe the CMD in March could be another catalyst for confidence in Nokia's ability to return to higher margins medium and long-term; and 4) as Ericsson's commentary in our view suggests that there could be increasing order momentum from operators with Chinese gear suppliers globally that feel an increased urgency during 2021 to diversify and de-risk their supplier base, we expect Nokia to be a key beneficiary of this trend. Our Nokia target price is supported by our DCF and our SOTP valuation" ("Positive implications from Ericsson," *DNB Markets*, February 1, 2021, p. 1).

[62] Nokia had a raw return on February 2, 2021 of -7.4%, which was lower than 98.2% of stocks listed on the NYSE and Nasdaq.

[63] "Press and stock exchange releases," *Nokia*, available at https://www.nokia.com/about-us/newsroom/press-and-stock-exchange-releases/.

[64] "Six months after launching Singapore's first non-standalone 5G services for consumers and enterprises, longstanding partners, StarHub and Nokia have teamed up again to deploy a new cloud-native 5G core network to

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

announced that it "ha[d] reached 100 million fiber broadband shipments."[65] Further, on February 2, 2021, Nokia and Vodafone announced the "successful trial of a new" technology.[66] None of the Nokia analyst reports I reviewed commented on these announcements.

39. On February 3, 2021, Nokia had a residual return of 4%, which was not statistically significant.[67] On the morning of this day, Societe Generale issued an analyst report, raising its price target from €3.9 to €4.5.[68]

40. On February 4, 2021, Nokia had a statistically significant residual return of -8%.[69] On February 4, 2021, before market open, and after Robinhood's trading restrictions on Nokia had been lifted,[70] Nokia issued financial results that contained mixed results.[71] For example, the

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manage 5G standalone (SA) bandwidth demand that has been projected to grow rapidly and tremendously. The 5G SA network rollout is well underway and spans core, radio, software, security and professional services with a 5G SA data service launch for StarHub's customers expected in later this year. This 5G SA upgrade will enable StarHub to run 5G technology independent of existing 4G network technology. With 5G SA technology, StarHub can simultaneously connect a vast number of devices and offer game-changing mobility solutions that thrive on ultra-high speed, low-latency, secure campus networking capabilities for the benefit of consumers, businesses and government agencies in Singapore" ("Press Release: Nokia and StarHub partner to expedite standalone 5G services for Singapore customers," *Dow Jones Institutional News*, February 1, 2021, 9:00PM).

[65] "Nokia today announced that it has reached 100 million fiber broadband shipments. This marks another milestone for Nokia in the North America fiber market after achieving world firsts for large GPON deployments, Gigabit cities and 10 Gigabit rollouts. Nokia has commemorated this latest milestone by awarding a golden Optical Network Terminal (ONT) to TDS Telecommunications LLC, the recipient of the 100 millionth unit" ("Press Release: Nokia ships its 100 millionth fiber solution helping TDS to introduce 10G speeds," *Dow Jones Institutional News*, February 2, 2021, 9:00AM).

[66] "Nokia and Vodafone have announced the successful trial of a new Passive Optical Network (PON) technology capable of delivering speeds up to 100 gigabits per second (Gb/s) on a single wavelength 10 times faster than the most advanced networks available today. This marks the latest industry-first in fiber access for Nokia, following breakthroughs in 10G PON, TWDM-PON, universal PON and 25G PON" ("Nokia and Vodafone showcase record-breaking 100 gigabit fiber broadband," *ENP Newswire*, February 2, 2021). The press release does not have a timestamp, and may have been released after market close. However, the residual return the following day was not statistically significant.

[67] Nokia had a raw return on February 3, 2021 of 3.8%, which was higher than 83.3% of stocks listed on the NYSE and Nasdaq.

[68] "Looking beyond a seasonally strong 4Q20, what are the risks to 2021 expectations?" *Societe Generale*, February 3, 2021, p. 1. According to Capital IQ, this analyst report was available at 8:19AM on February 3, 2021 (*Capital IQ*).

[69] Nokia had a raw return on February 4, 2021 of -7.0%, which was lower than 98.7% of stocks listed on the NYSE and Nasdaq.

[70] **Exhibit 2.**

[71] "Nokia Corporation Financial Report for Q4 and Full Year 2020," Nokia Press Release, February 4, 2021, 1:00AM, available at https://www.nokia.com/about-us/news/releases/2021/02/04/nokia-corporation-financial-report-for-q4-and-full-year-2020/.

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

Morgan Stanley analyst stated, "[w]e expect a slight negative reaction to shares this morning given slightly lower sales and operating profit outlook versus consensus, though Nokia showed better Q4 performance."[72] A Raymond James analyst report stated that it would maintain its rating "following [Nokia's] slight 4Q20 beat and outlook in-line with expectations."[73] Additionally, before market open, Nokia announced that it was issuing shares to Nokia Corporation to fulfill its equity plans that vested in 2021 and Q1 2022.[74] To the extent the earnings information and the share issuance impacted Nokia's stock price, it would only have an impact on February 4, 2021, which was after the trade restrictions on Nokia had been lifted.[75]

VIII. Tootsie Roll

41. During the proposed Class Period, Tootsie Roll's cumulative return was -27%. During this time period, Tootsie Roll had five statistically significant daily residual returns ranging from -17% to 4%. I did not identify any new, potentially value-relevant information during the proposed Class Period.

IX. Trivago

42. During the proposed Class Period, Trivago's cumulative return was -25%. During this time period, Trivago had one statistically significant daily residual return of -26% on January 28,

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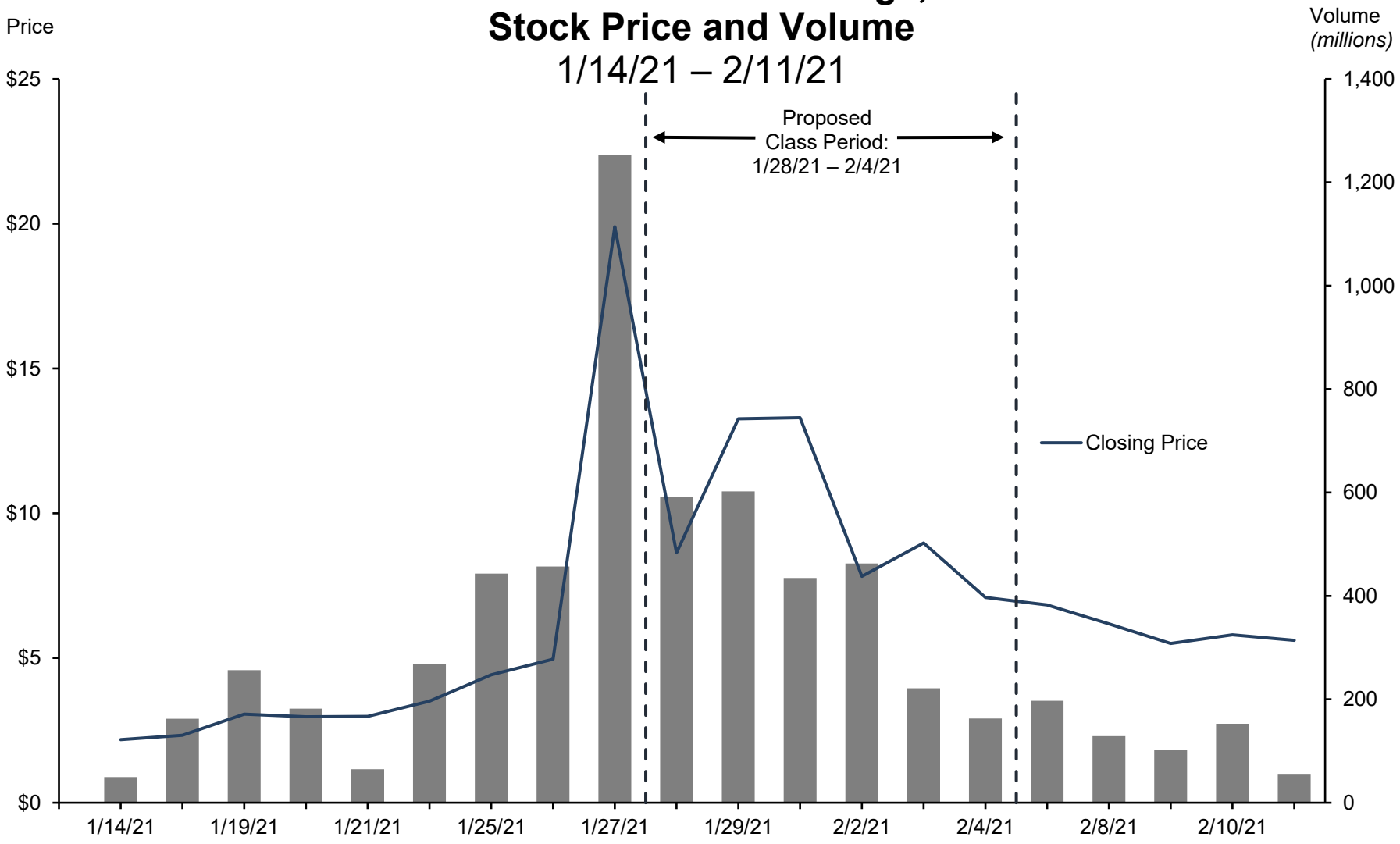
[72] "2021 targets further clarified with modest downside," *Morgan Stanley*, February 4, 2021, p. 1.
[73] "4Q20 Report: Firmly on the Fence," *Raymond James*, February 4, 2021, p. 1.
[74] "Nokia's Board of Directors has resolved to issue 21 575 000 new shares in a directed share issuance without consideration to Nokia Corporation to be later used to fulfil the company's obligations primarily under its equity plans that vest in 2021 and in the first quarter of 2022" ("Nokia Board of Directors resolved to issue shares to the company and resolved on a directed share issuance for the settlement of shares under previous Nokia Equity Programs," Nokia Press Release, February 4, 2021, 2:00AM, available at https://www.nokia.com/about-us/news/releases/2021/02/04/nokia-board-of-directors-resolved-to-issue-shares-to-the-company-and-resolved-on-a-directed-share-issuance-for-the-settlement-of-shares-under-previous-nokia-equity-programs/).
[75] **Exhibit 2.**

Appendix F
Potentially Value-Relevant Information During the Proposed Class Period 1/28/21 – 2/4/21

2021.[76] I did not identify any new, potentially value-relevant information during the proposed Class Period.

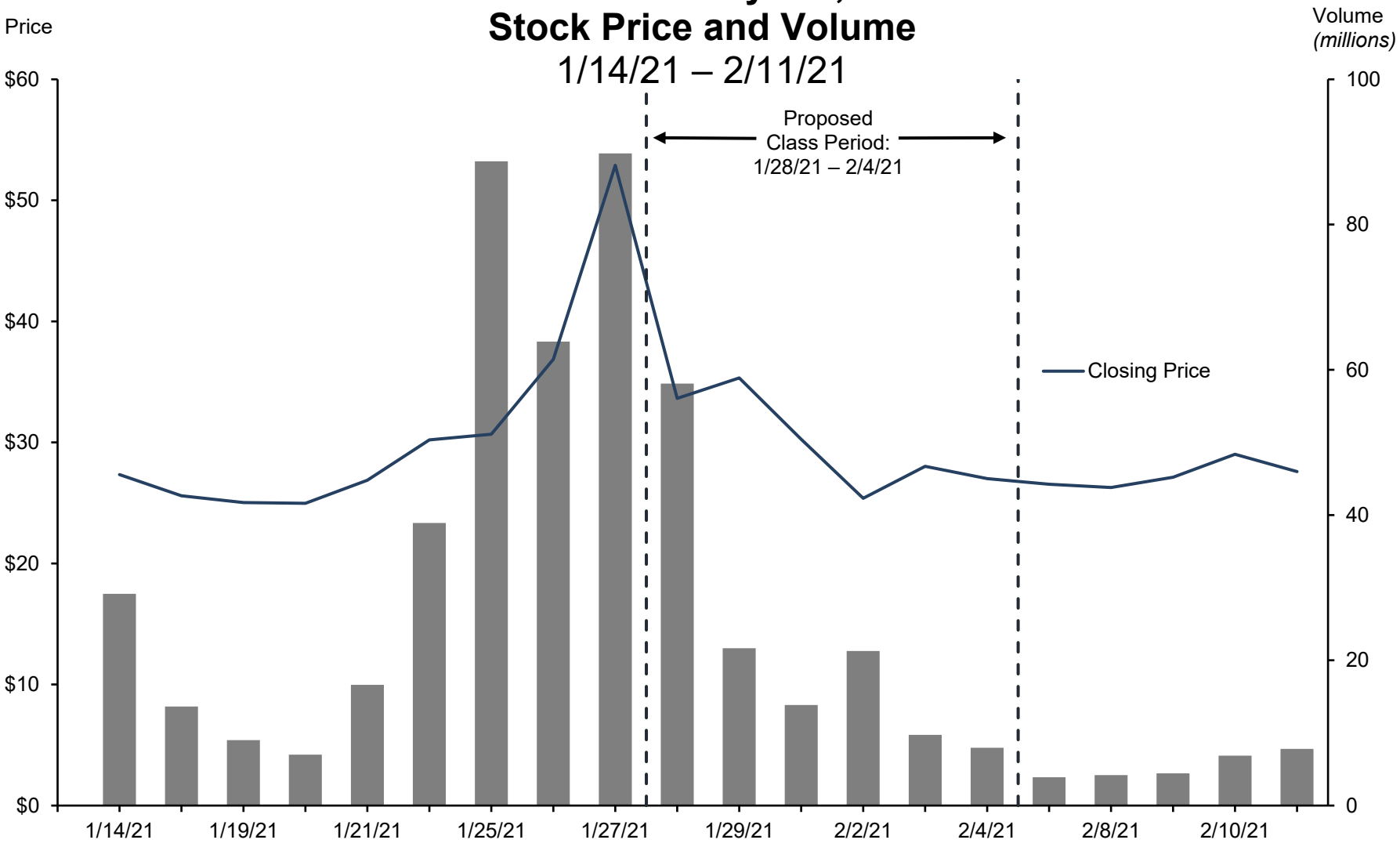
[76] Trivago had a raw return on January 28, 2021 of -22.3%, which was lower than 99.5% of stocks listed on the NYSE and Nasdaq.

Exhibit 1A
AMC Entertainment Holdings, Inc.
Stock Price and Volume
1/14/21 – 2/11/21



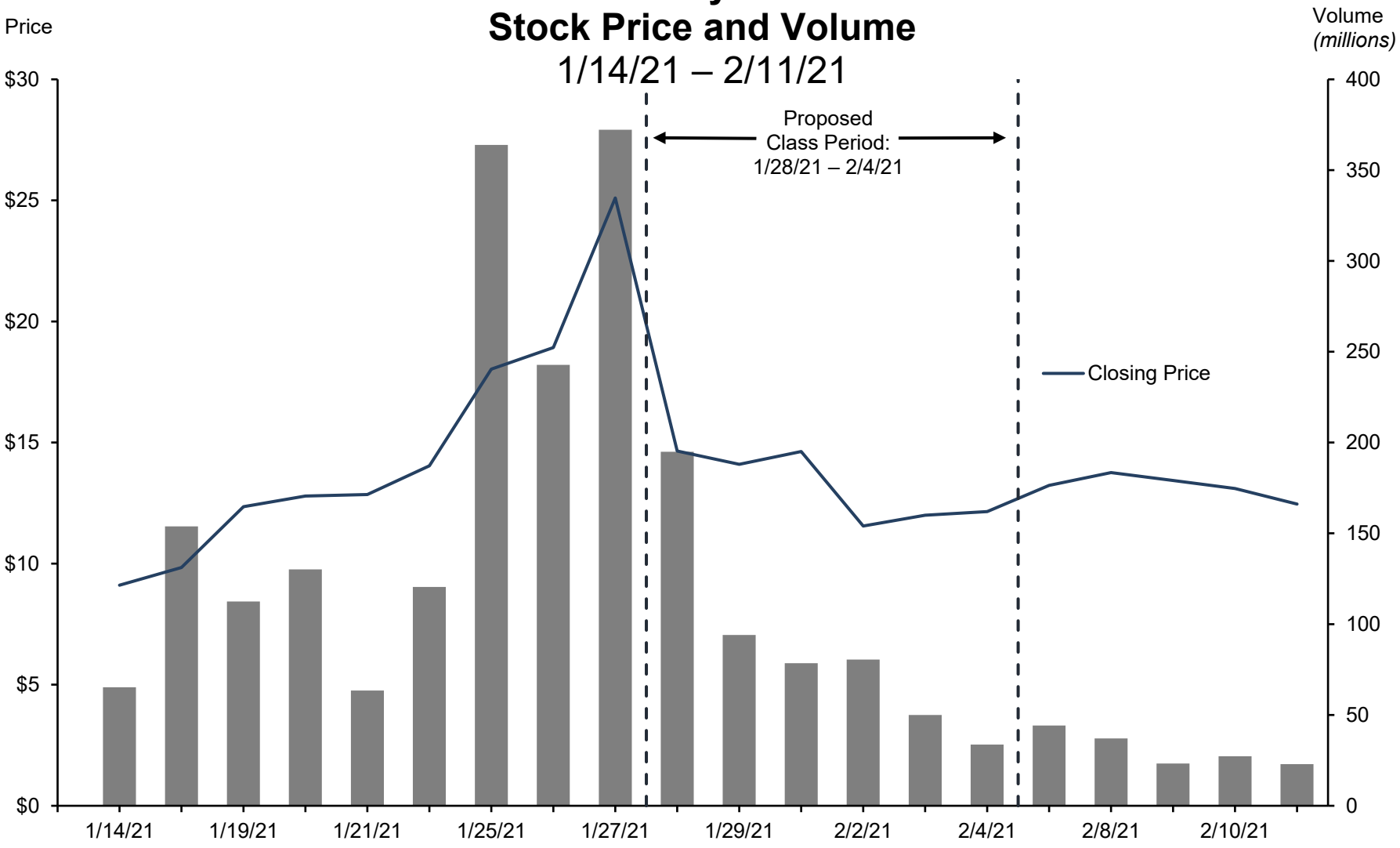
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1B
Bed Bath & Beyond, Inc.
Stock Price and Volume
1/14/21 – 2/11/21



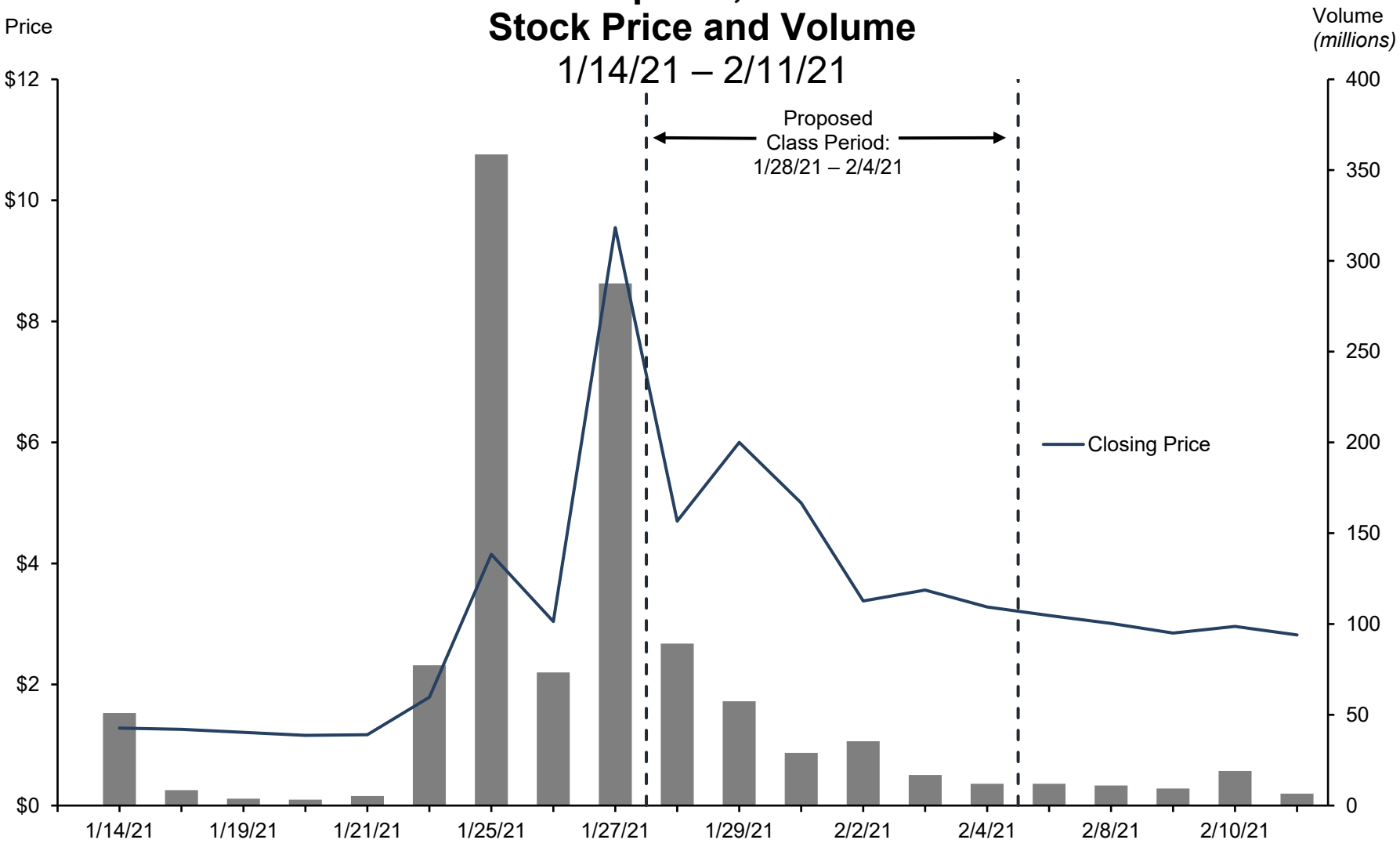
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1C
BlackBerry Limited
Stock Price and Volume
1/14/21 – 2/11/21



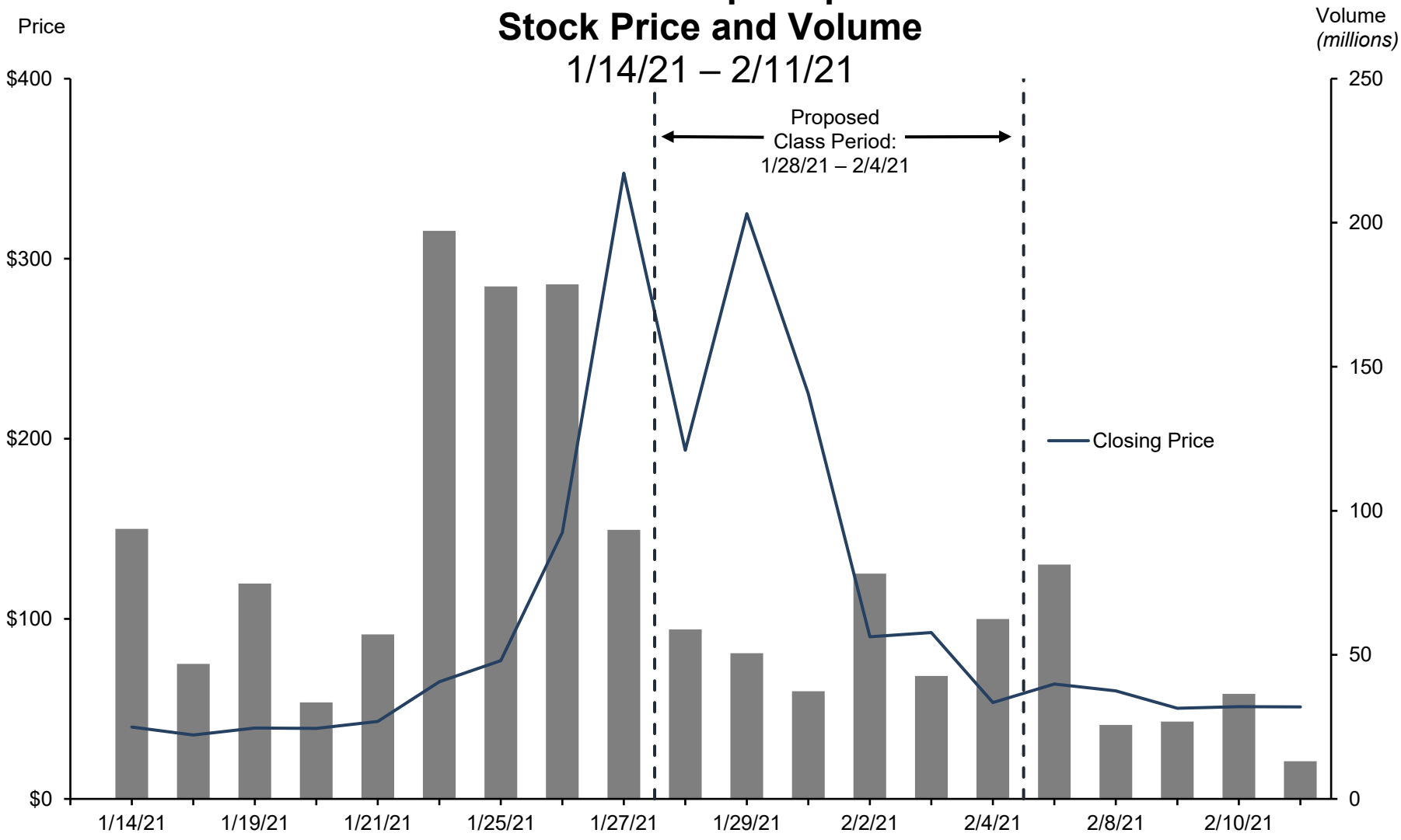
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1D
Express, Inc.
Stock Price and Volume
1/14/21 – 2/11/21



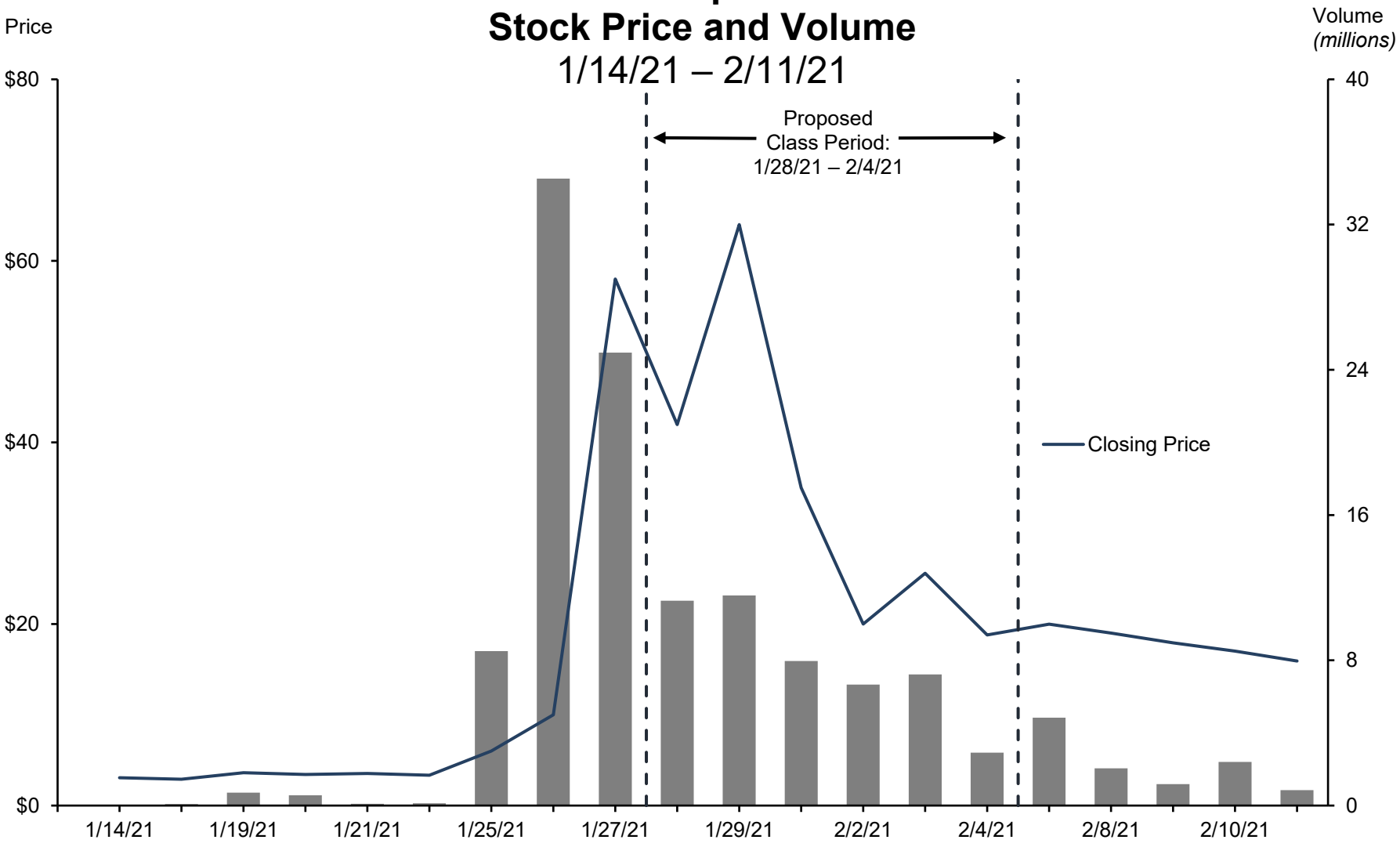
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1E
GameStop Corp.
Stock Price and Volume
1/14/21 – 2/11/21



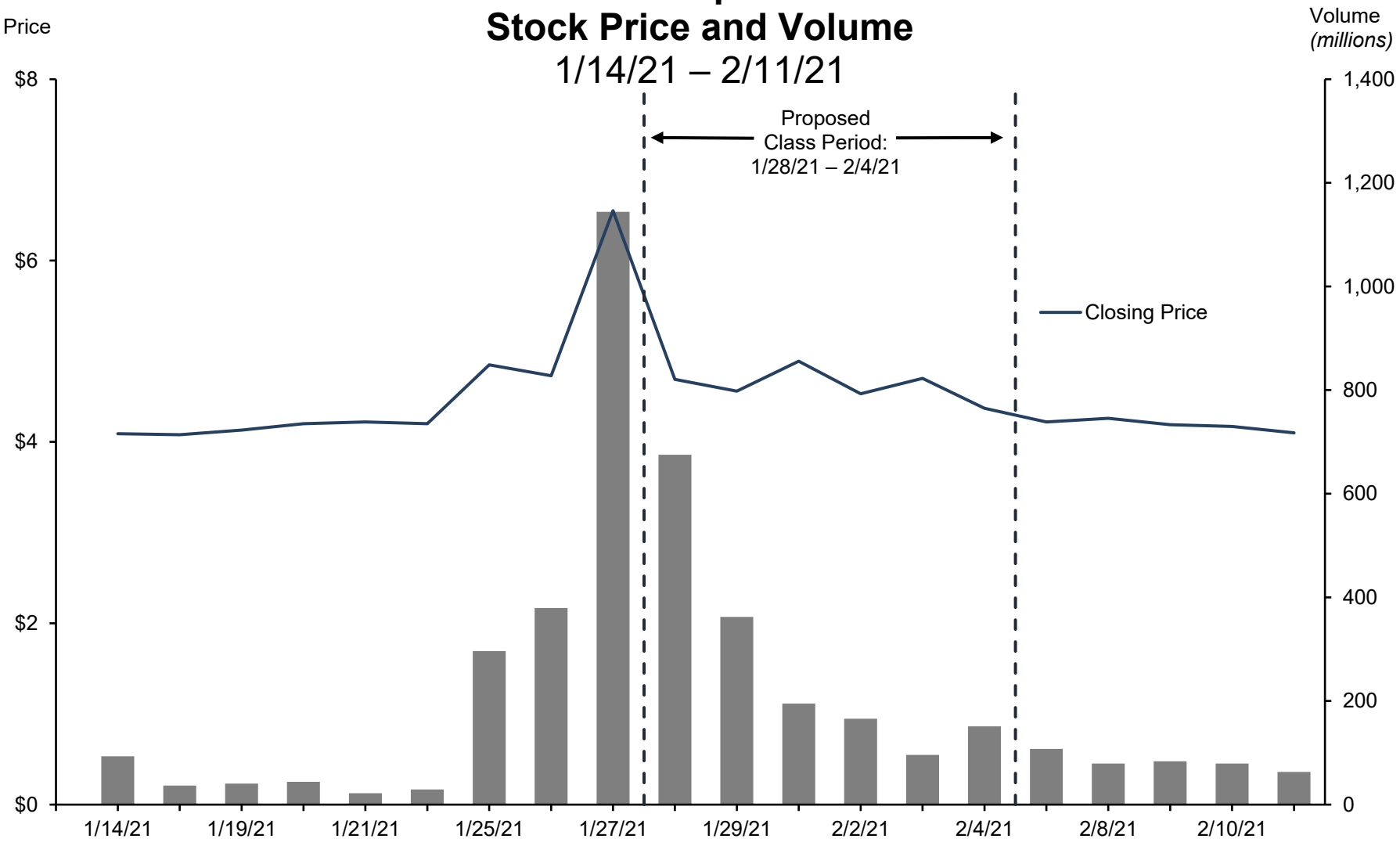
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1F
Koss Corporation
Stock Price and Volume
1/14/21 – 2/11/21



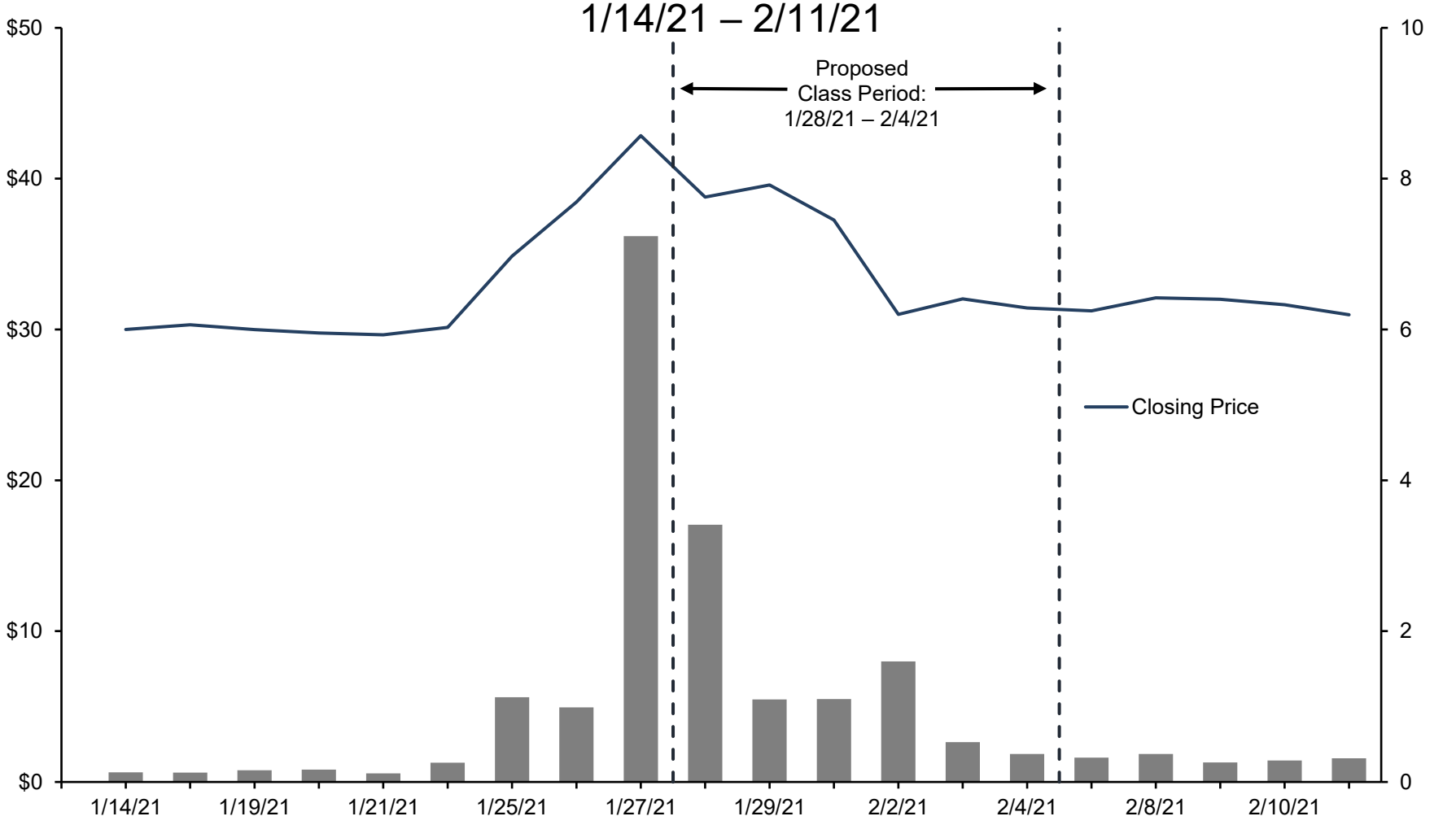
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1G
Nokia Corporation
Stock Price and Volume
1/14/21 – 2/11/21



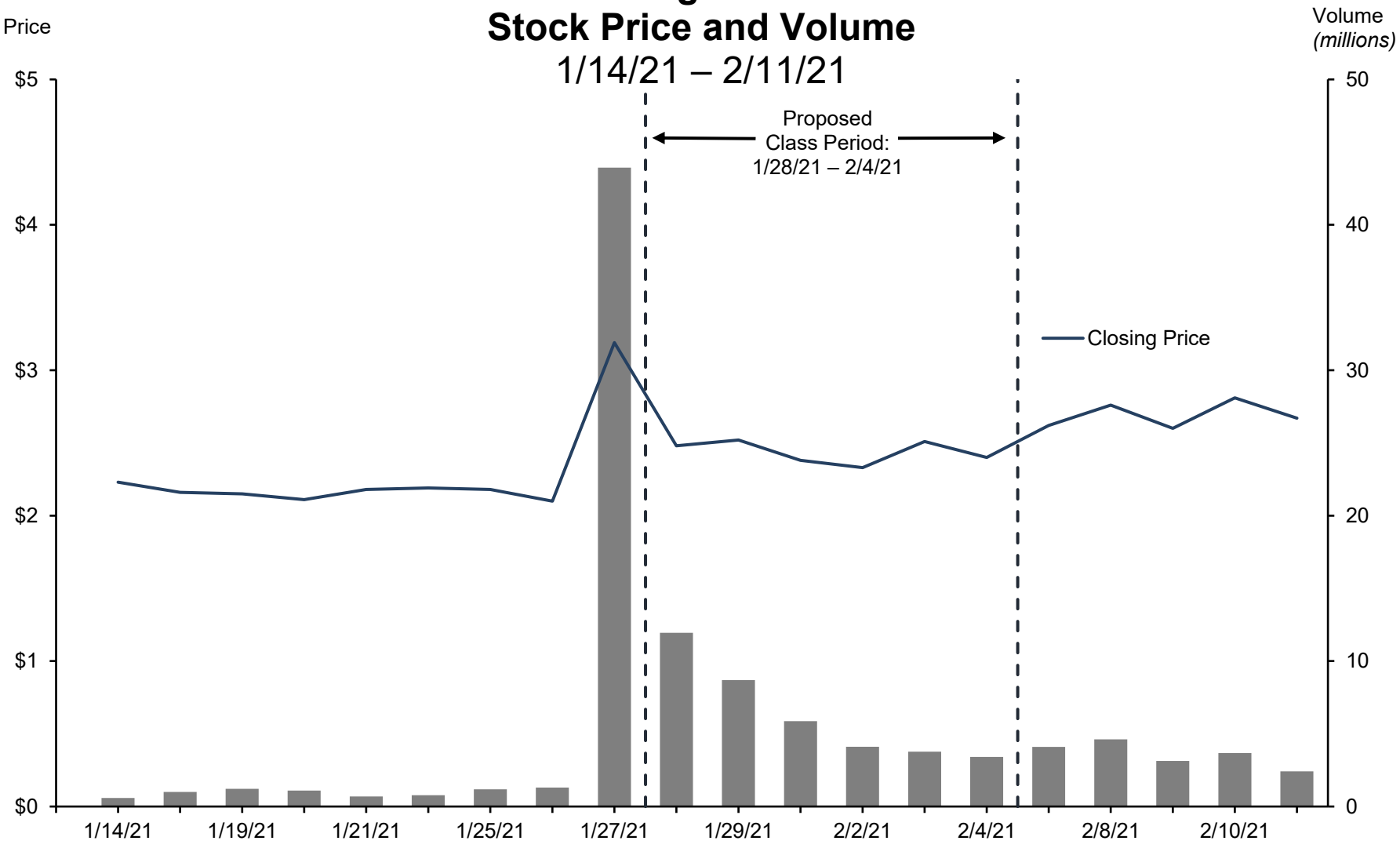
Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1H
Tootsie Roll Industries Inc.
Stock Price and Volume
1/14/21 – 2/11/21



Source: *CRSP*; Complaint dated 1/17/23

Exhibit 1I
trivago N.V.
Stock Price and Volume
1/14/21 – 2/11/21



Source: *CRSP*; Complaint dated 1/17/23

Exhibit 2

Robinhood PCO Restrictions and Equity Position Limits for At-Issue Stocks[1]

1/28/21 – 2/4/21

At-Issue Stock	1/28/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post 4–8p[3][4]	Post 9p+[3]	1/29/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post[3]	2/1/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post[3]
AMC[5]										115	115	115	115	115	25	10	1	1	1	10	10	10	75	75	350	350	350	350
BB[6]										65	65	65	65	65	25	5	1	1	1	700	700	700	700	700	700	700	700	700
BBBY[7]										30	30	30	30	30	30	2	1	1	1									
EXPR[8]										200	200	200	200	200	200	5	5	5	5	20	20	20	200	200	1000	1000	1000	1000
GME[9]										5	5	5	5	5	2	1	1	1	1	1	1	1	4	4	20	20	20	20
KOSS[10]										25	25	25	25	25	10	1	1	1	1	2	2	2	25	25	150	150	150	150
NOK[11]										110	110	110	110	110	50	20	5	5	5	200	200	200	2000	2000	2000	2000	2000	2000
TR[12]										25	25	25	25	25	25			1	1									
TRVG[13]										400	400	400	400	400	400		5	5	5									

At-Issue Stock	2/2/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post[3]	2/3/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post[3]	2/4/21 Pre[2]	9a	10a	11a	12p	1p	2p	3p	Post[3]
AMC[5]	350	350	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	5500	5500	5500	5500	5500	5500	5500	5500	5500	
BB[6]	700	700																									
BBBY[7]																											
EXPR[8]	1000	1000	3000	3000	3000	3000	3000	3000																			
GME[9]	20	20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	500	500	500	500	500	500	500	500	500	
KOSS[10]	150	150																									
NOK[11]	2000	2000	2000	2000	2000	2000	2000	2000																			
TR[12]																											
TRVG[13]																											

At-Issue Stock has PCO restrictions

At-Issue Stock has equity position limits

Source: RHMDL00047970

Note:

[1] PCO Restrictions and Equity Position Limits during each hour reflect the restrictions and limits in place at the end of the hour.

[2] Pre represents hours before 9:00 AM (market open is 9:30 AM).

[3] Post represents hours after 4:00 PM (market close is 4:00 PM).

[4] PCO Restrictions ended post-market hours at 9:41 PM on 1/28/21 for all nine At-Issue Stocks.

[5] AMC had PCO restrictions from 1/28/21 8:07:31 AM until 1/28/21 9:41:40 PM. AMC had equity position limits from 1/28/21 9:08:36 PM until 2/4/21 9:17:50 PM.

[6] BB had PCO restrictions from 1/28/21 8:09:28 AM until 1/28/21 9:41:42 PM. BB had equity position limits from 1/28/21 9:08:36 PM until 2/2/21 10:44:45 AM.

[7] BBBY had PCO restrictions from 1/28/21 8:10:19 AM until 1/28/21 9:41:27 PM. BBBY had equity position limits from 1/28/21 9:08:36 PM until 1/30/21 9:46:59 PM.

[8] EXPR had PCO restrictions from 1/28/21 8:10:51 AM until 1/28/21 9:41:35 PM. EXPR had equity position limits from 1/28/21 9:08:36 PM until 2/2/21 8:15:27 PM.

[9] GME had PCO restrictions from 1/28/21 8:03:34 AM until 1/28/21 9:41:41 PM. GME had equity position limits from 1/28/21 9:08:36 PM until 2/4/21 9:17:50 PM.

[10] KOSS had PCO restrictions from 1/28/21 8:11:09 AM until 1/28/21 9:41:34 PM. KOSS had equity position limits from 1/28/21 9:08:36 PM until 2/2/21 10:44:45 AM.

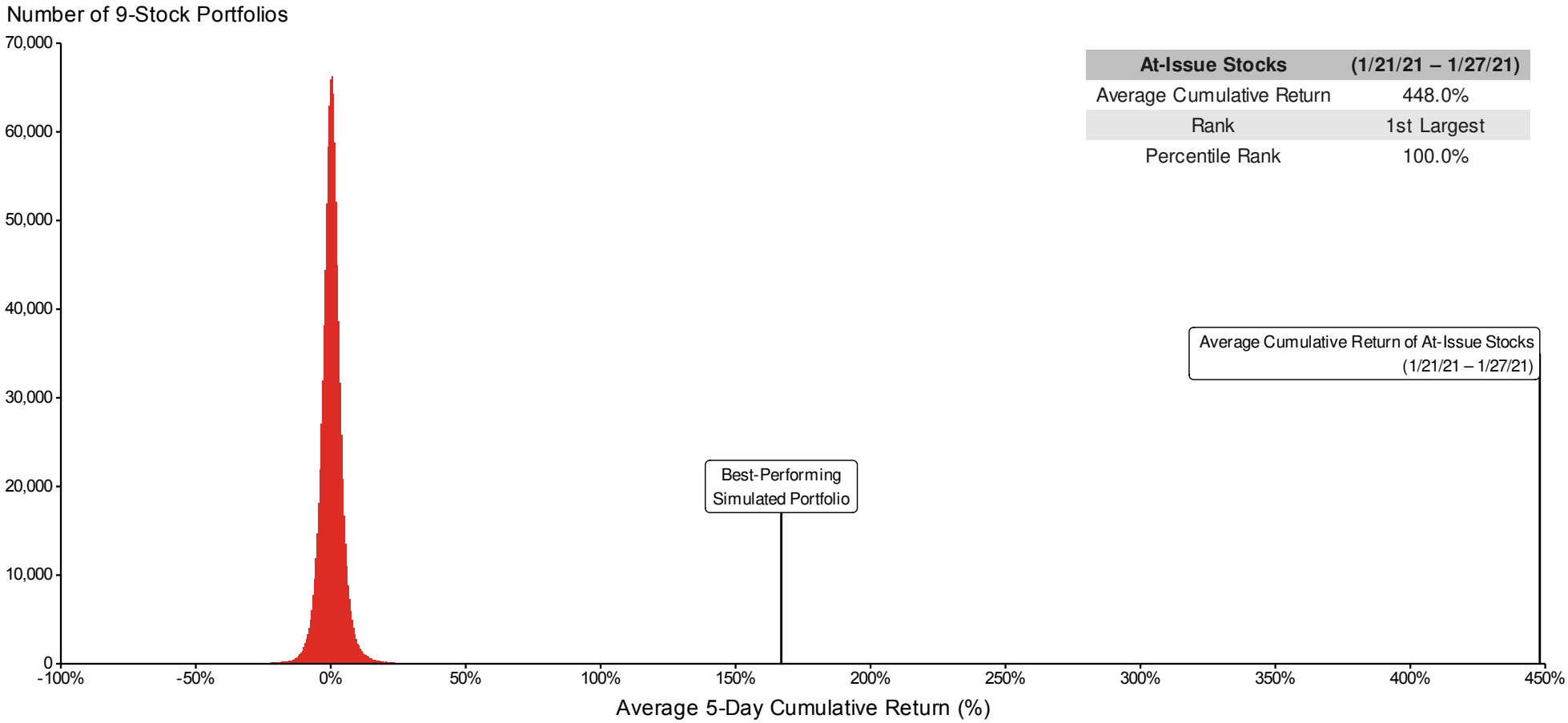
[11] NOK had PCO restrictions from 1/28/21 8:08:24 AM until 1/28/21 9:41:41 PM. NOK had equity position limits from 1/28/21 9:08:36 PM until 2/2/21 8:15:27 PM.

[12] TR had PCO restrictions from 1/28/21 9:54:04 AM until 1/28/21 9:41:29 PM. TR had equity position limits from 1/28/21 9:08:36 PM until 1/29/21 1:36:53 PM and from 1/29/21 3:24:27 PM until 1/30/21 9:46:59 PM.

[13] TRVG had PCO restrictions from 1/28/21 8:09:23 AM until 1/28/21 9:41:43 PM. TRVG had equity position limits from 1/28/21 9:08:36 PM until 1/29/21 1:36:53 PM and from 1/29/21 2:48:07 PM until 1/30/21 9:46:59 PM.

Exhibit 3

Average 5-Day Cumulative Return of the 9 At-Issue Stocks (1/21/21 – 1/27/21) vs. a Simulated Distribution of the Average 5-Day Cumulative Return for a Random Portfolio of 9 NYSE/Nasdaq Stocks (12/27/95 – 1/20/21)



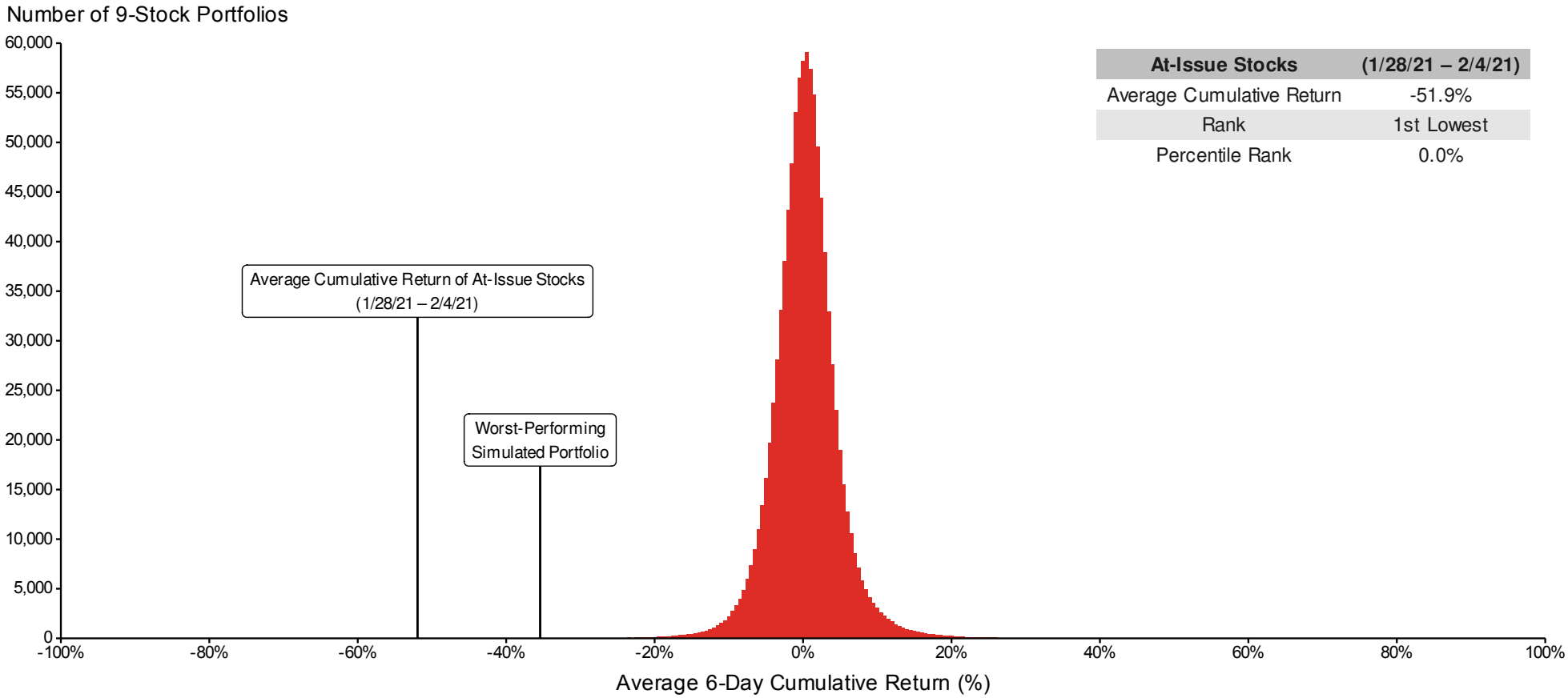
At-Issue Stocks	(1/21/21 – 1/27/21)
Average Cumulative Return	448.0%
Rank	1st Largest
Percentile Rank	100.0%

Source: *CRSP*

Note: The histogram shows the distribution of the equal-weighted average five-day cumulative return for a simulated portfolio of nine randomly-selected NYSE/Nasdaq-listed common stocks or ADRs. The width of each histogram bin is 0.5% in return. For the simulation analysis, a five-day period between 12/27/95 and 1/20/21 ("Selected Period") is randomly selected. Then, nine stocks are randomly selected with replacement from the set of NYSE/Nasdaq-listed stocks or ADRs for which stock returns data is available during the Selected Period ("Selected Stocks"). Finally, the equal-weighted average five-day cumulative return is calculated for the Selected Stocks during the Selected Period. This process is repeated one million times to create the simulated distribution of equal-weighted average five-day cumulative returns. This analysis compares the equal-weighted average five-day cumulative return of the nine At-Issue Stocks between 1/21/21 and 1/27/21 to the simulated distribution. The rank and percentile rank for the At-Issue Stocks is relative to the simulated distribution.

Exhibit 4

Average 6-Day Cumulative Return of the 9 At-Issue Stocks (1/28/21 – 2/4/21) vs. a Simulated Distribution of the Average 6-Day Cumulative Return for a Random Portfolio of 9 NYSE/Nasdaq Stocks (1/2/96 – 1/19/21)

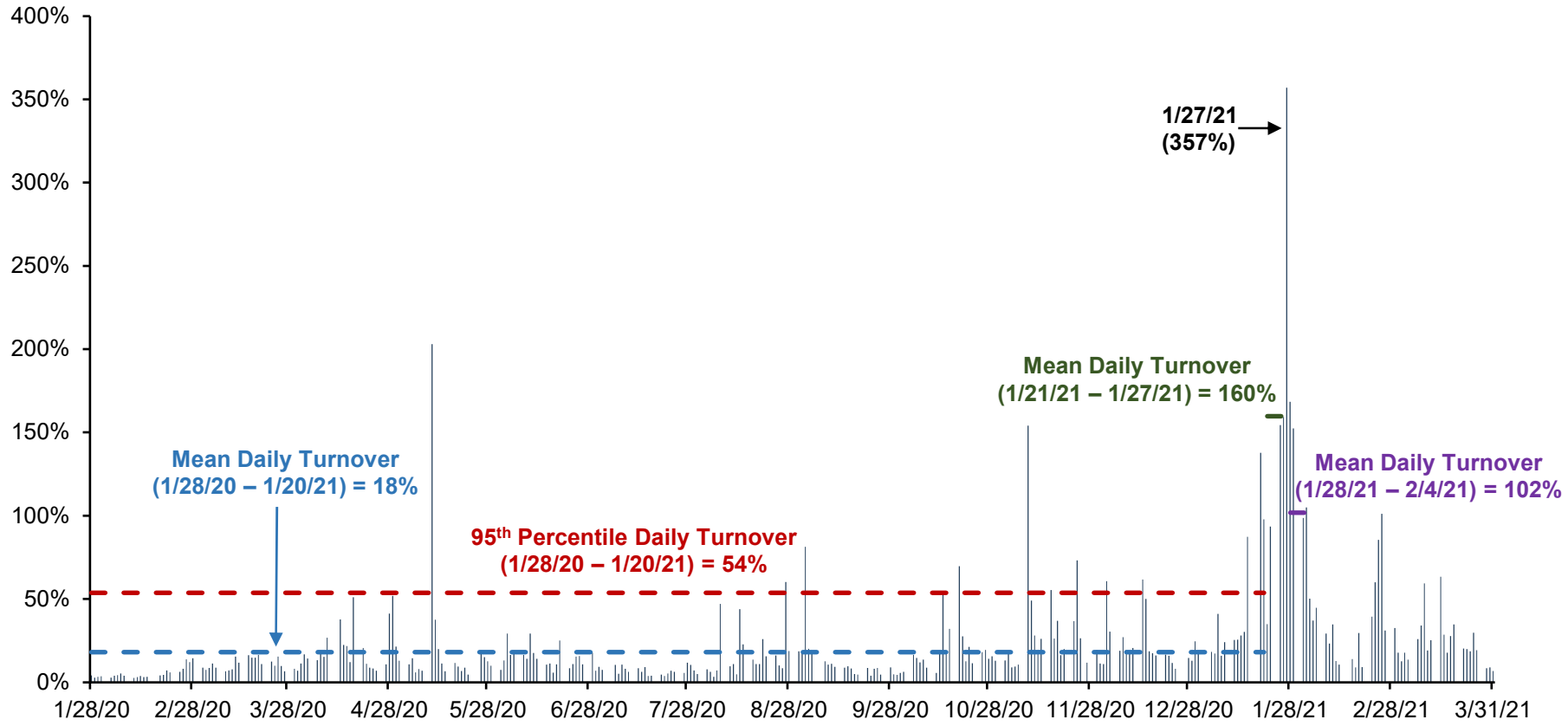


At-Issue Stocks	(1/28/21 – 2/4/21)
Average Cumulative Return	-51.9%
Rank	1st Lowest
Percentile Rank	0.0%

Source: *CRSP*

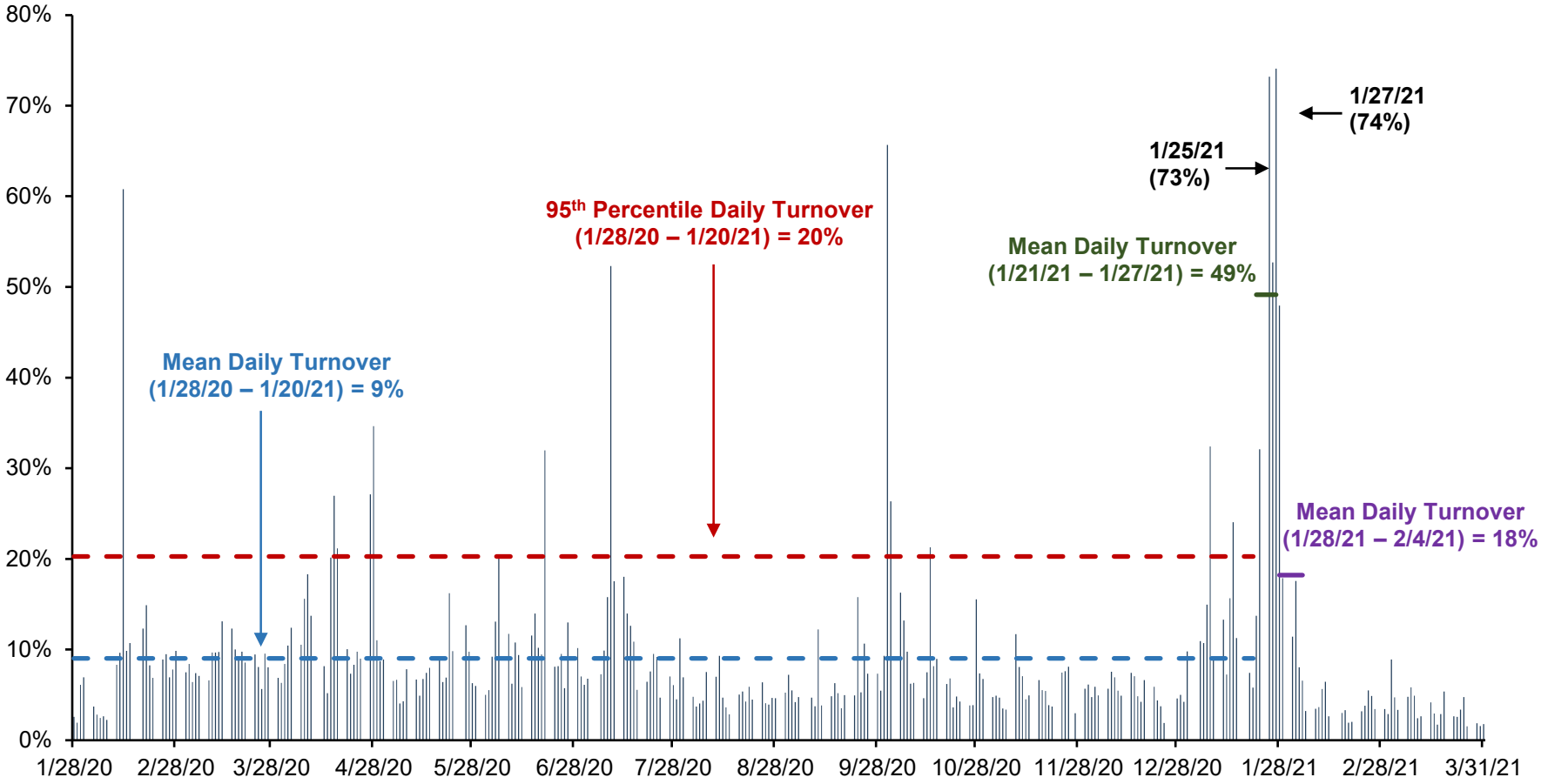
Note: The histogram shows the distribution of the equal-weighted average six-day cumulative return for a simulated portfolio of nine randomly-selected NYSE/Nasdaq-listed common stocks or ADRs. The width of each histogram bin is 0.5% in return. For the simulation analysis, a six-day period between 1/2/96 and 1/19/21 ("Selected Period") is randomly selected. Then, nine stocks are randomly selected with replacement from the set of NYSE/Nasdaq-listed stocks or ADRs for which stock returns data is available during the Selected Period ("Selected Stocks"). Finally, the equal-weighted average six-day cumulative return is calculated for the Selected Stocks during the Selected Period. This process is repeated one million times to create the simulated distribution of equal-weighted average six-day cumulative returns. This analysis compares the equal-weighted average six-day cumulative return of the nine At-Issue Stocks between 1/28/21 and 2/4/21 to the simulated distribution. The histogram does not show 14 portfolios due to their equal-weighted average six-day cumulative return exceeding the x-axis maximum of 100%. The rank and percentile rank for the At-Issue Stocks is relative to the simulated distribution.

Exhibit 5A
AMC Entertainment Holdings, Inc.
Daily Turnover Ratio
1/28/20 – 3/31/21



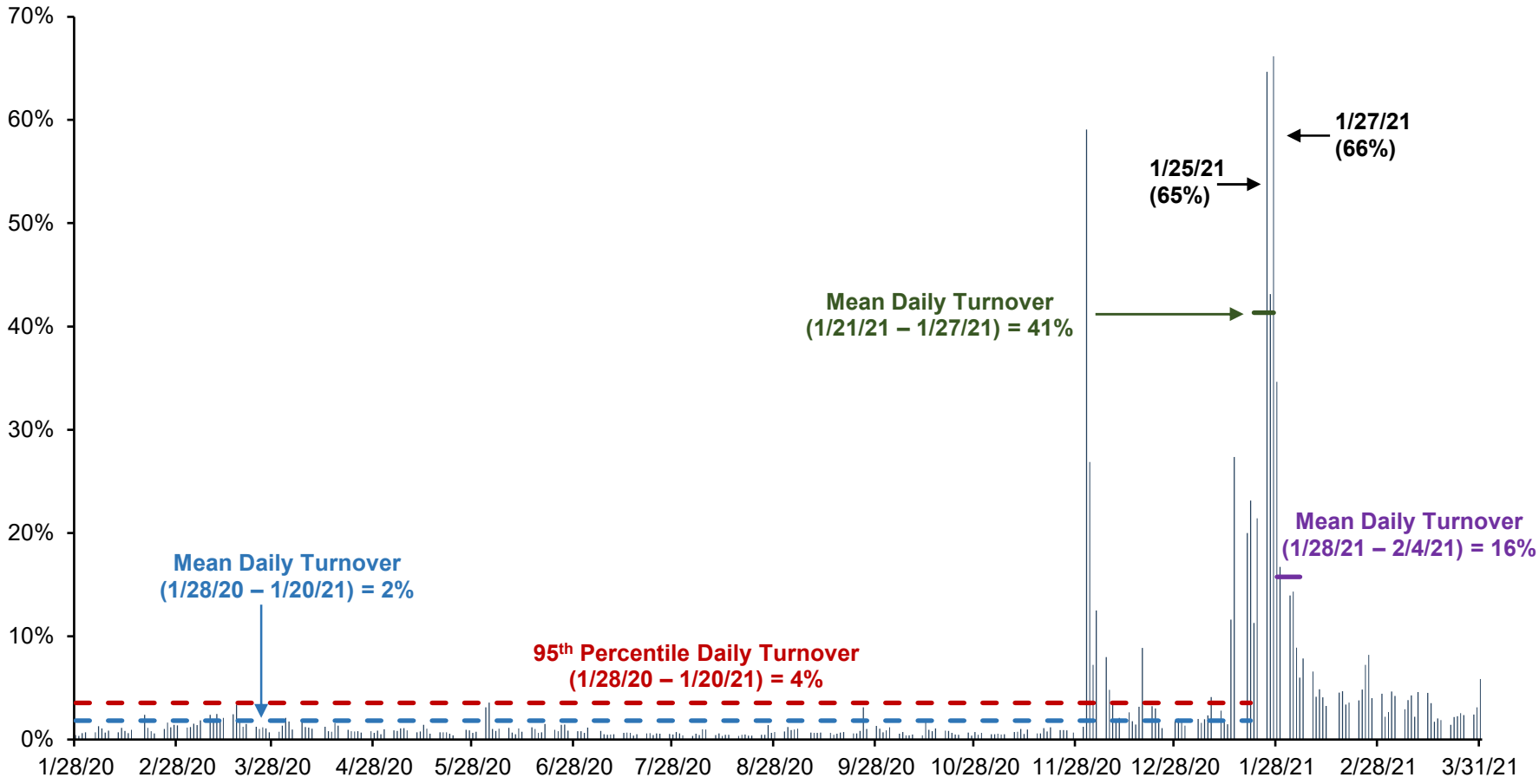
Source: *CRSP*; "AMC Entertainment 4Q Preview and Balance Sheet Update," *Credit Suisse*, March 3, 2021, p. 3
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted. From 1/28/20 – 6/29/20, Daily Turnover is calculated using shares outstanding reported by CRSP. From 6/30/20 – 3/31/21, Daily Turnover is calculated using shares outstanding reported by Credit Suisse, which reflects changes in shares outstanding before the changes are reflected in CRSP.

Exhibit 5B
Bed Bath & Beyond, Inc.
Daily Turnover Ratio
1/28/20 – 3/31/21



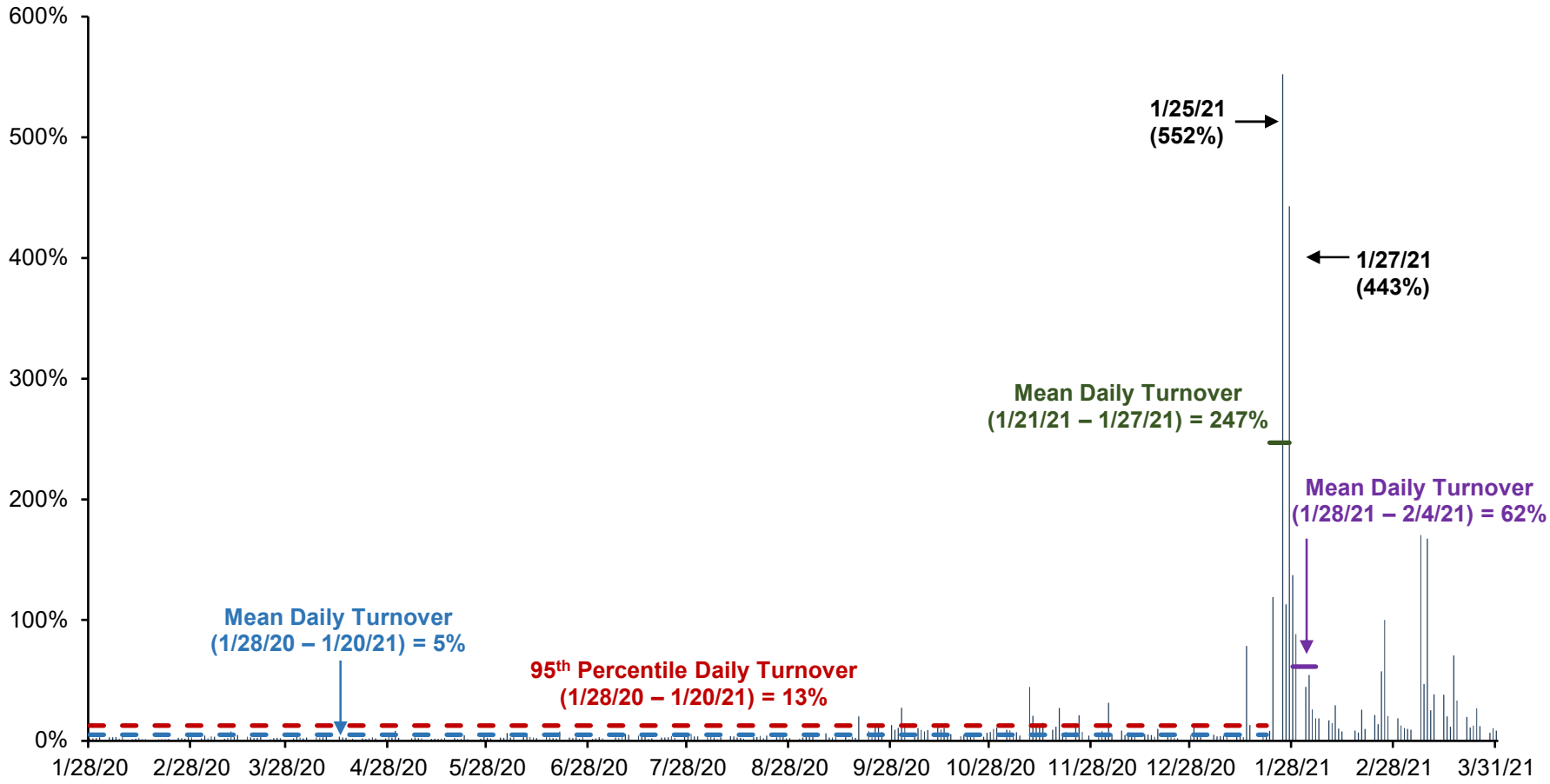
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5C
BlackBerry Limited
Daily Turnover Ratio
1/28/20 – 3/31/21



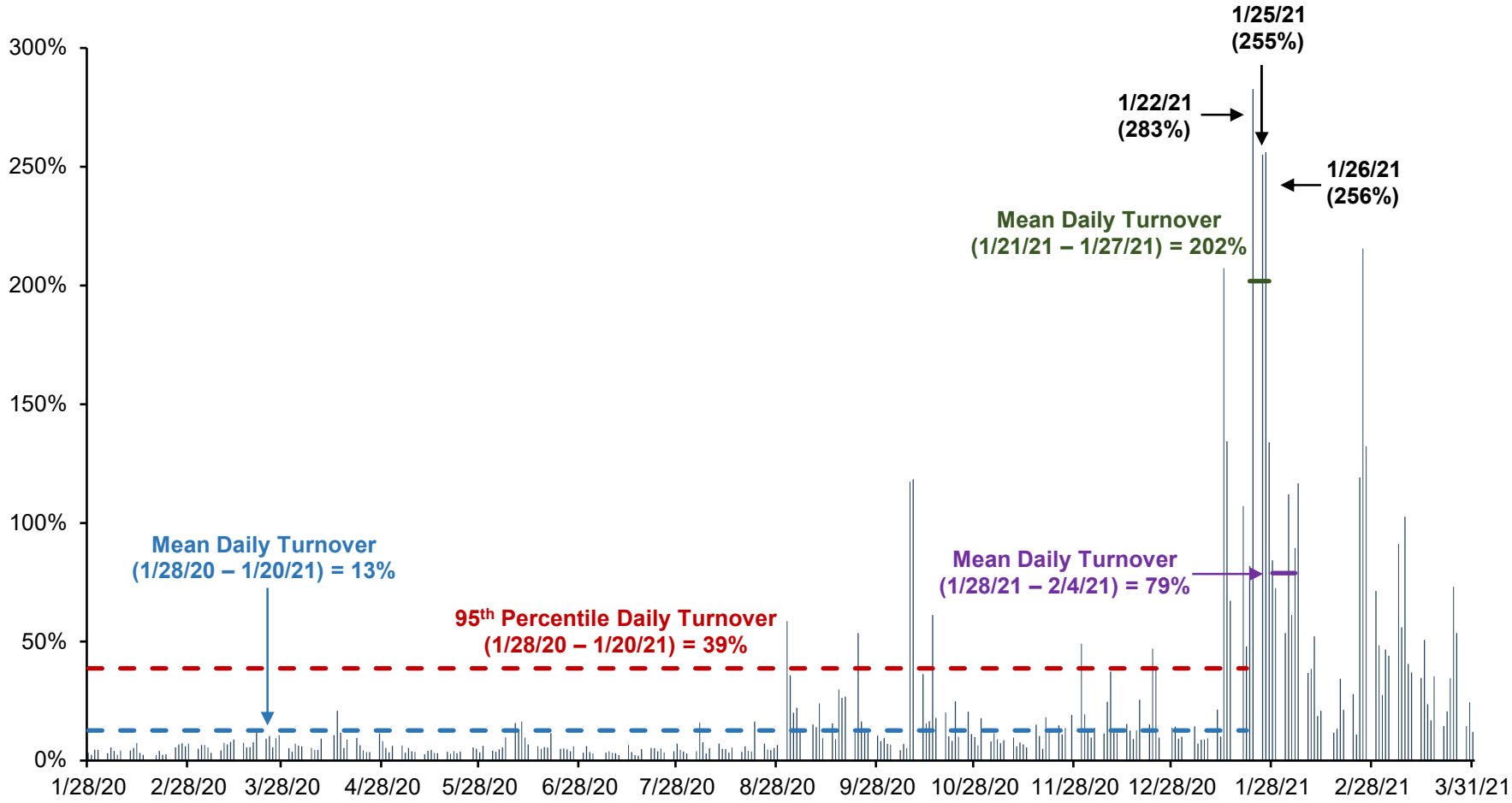
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5D
Express, Inc.
Daily Turnover Ratio
1/28/20 – 3/31/21



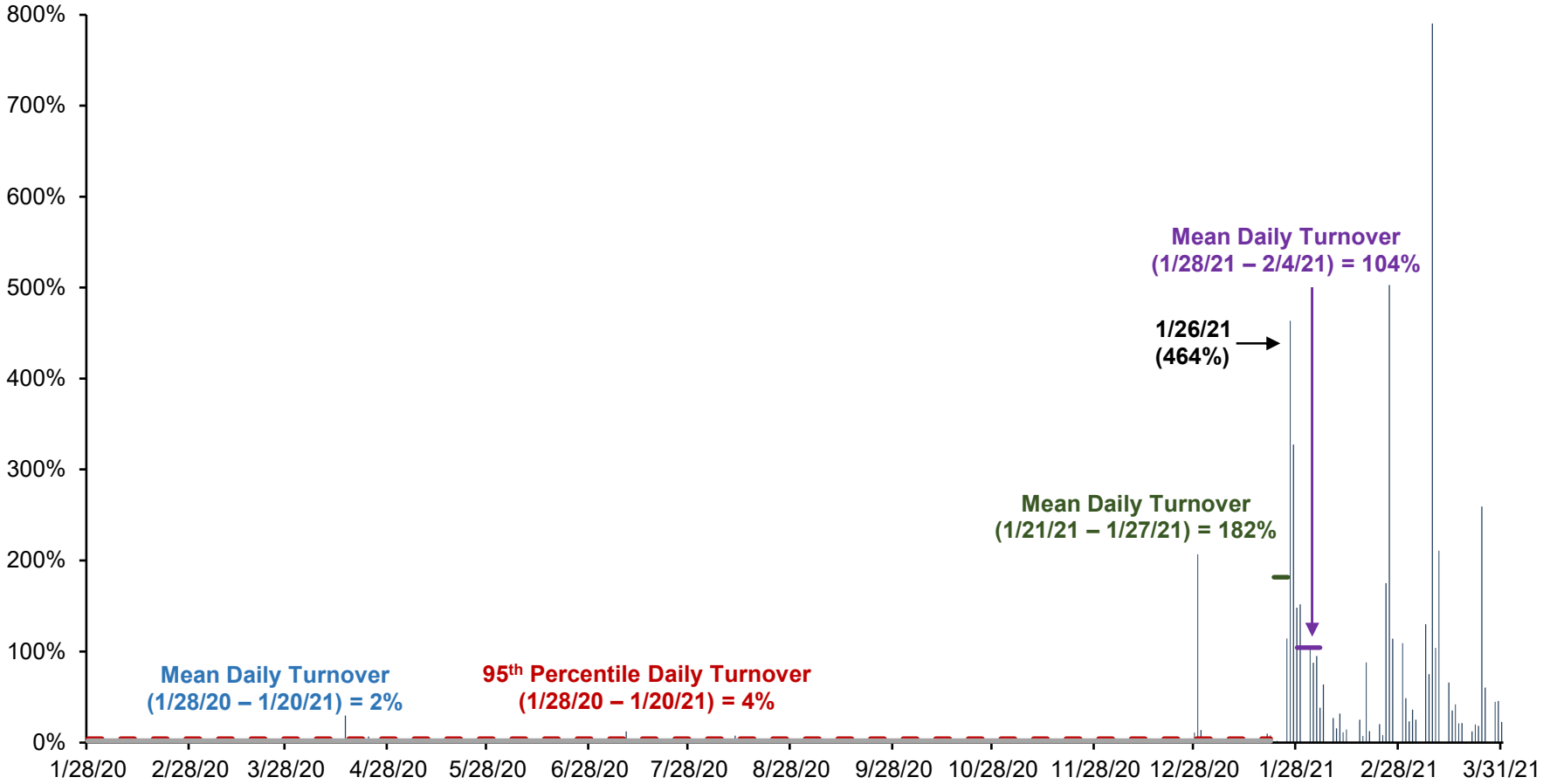
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5E
GameStop Corp.
Daily Turnover Ratio
1/28/20 – 3/31/21



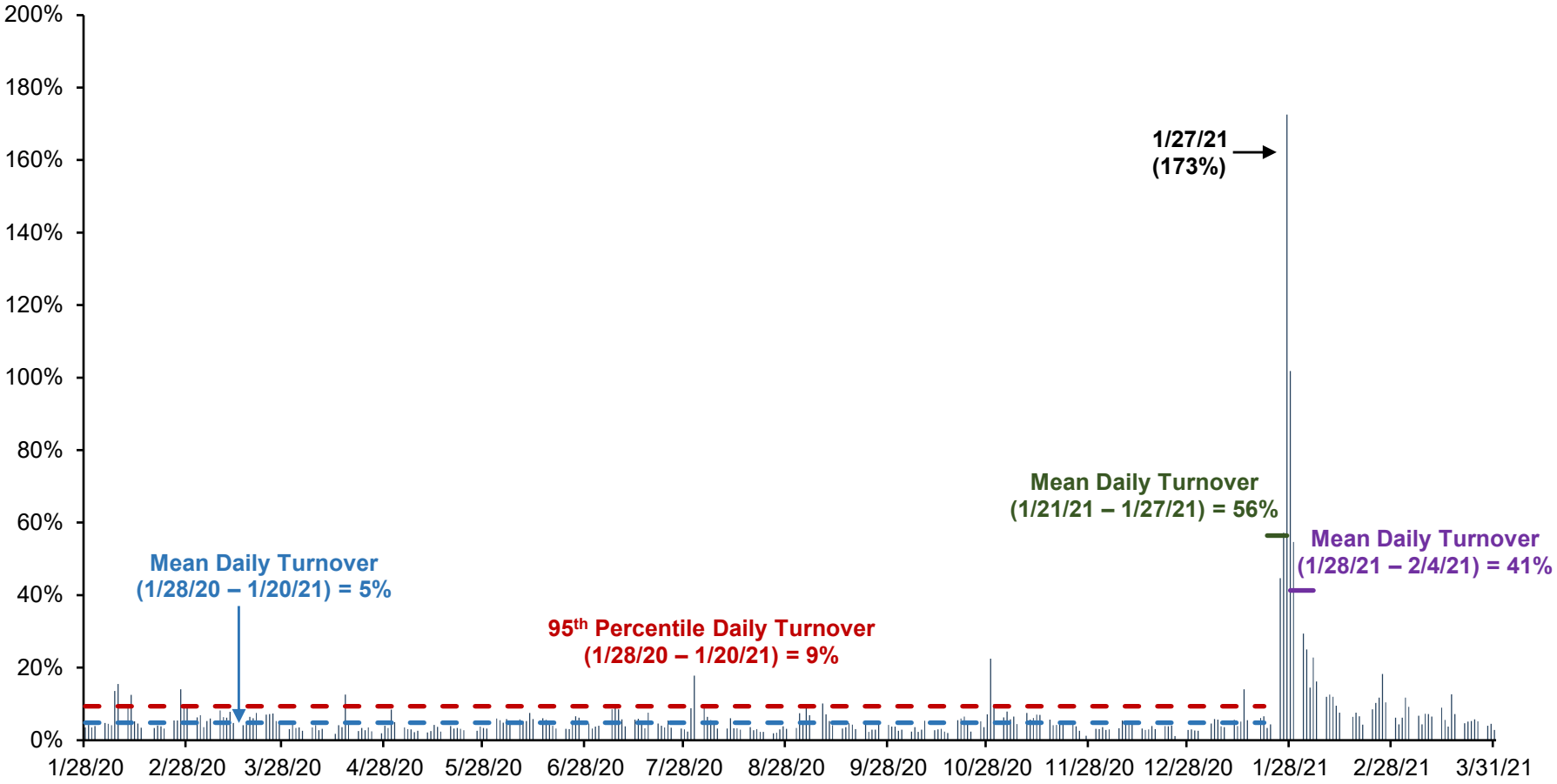
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5F
Koss Corporation
Daily Turnover Ratio
1/28/20 – 3/31/21



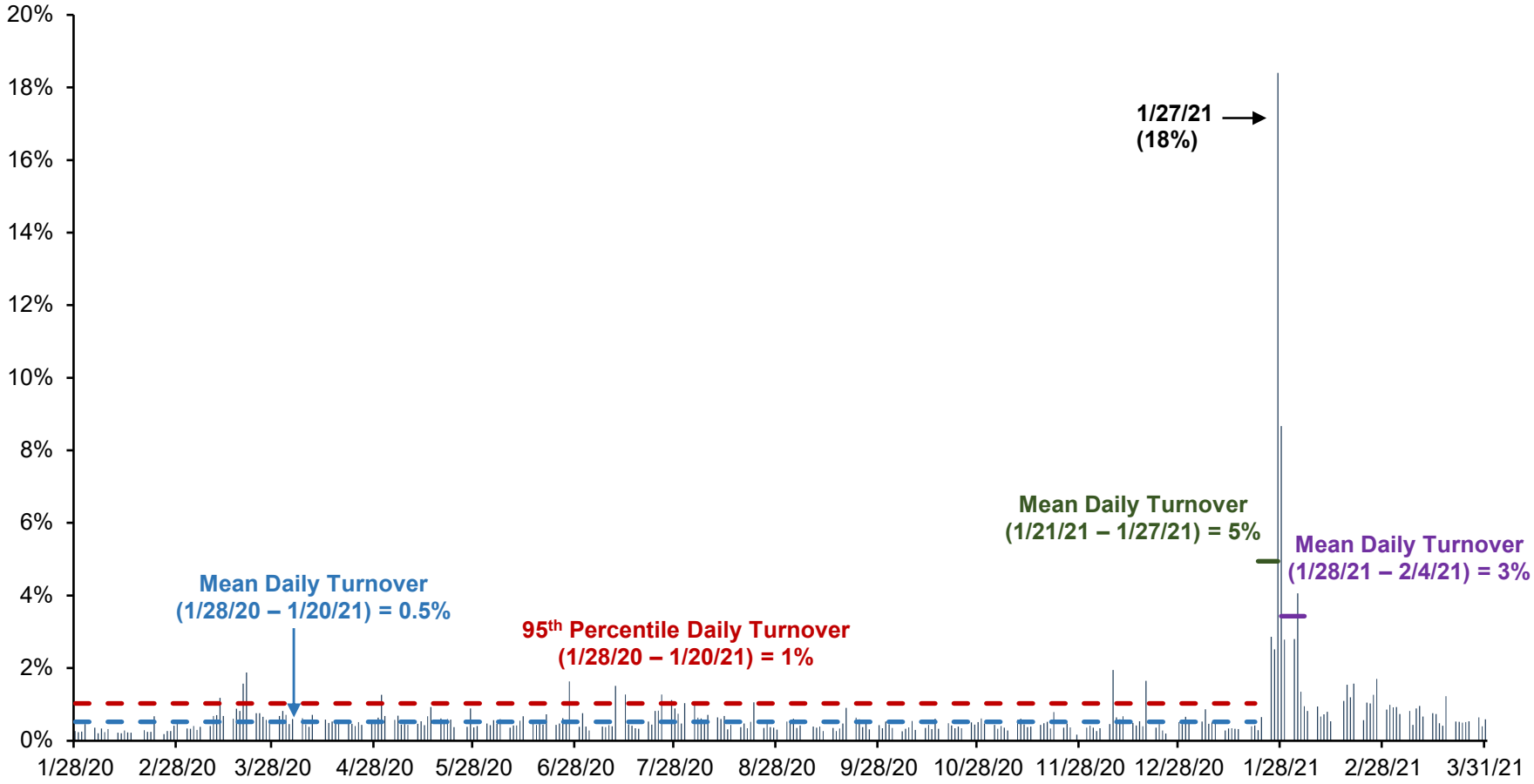
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5G
Nokia Corporation
Daily Turnover Ratio
1/28/20 – 3/31/21



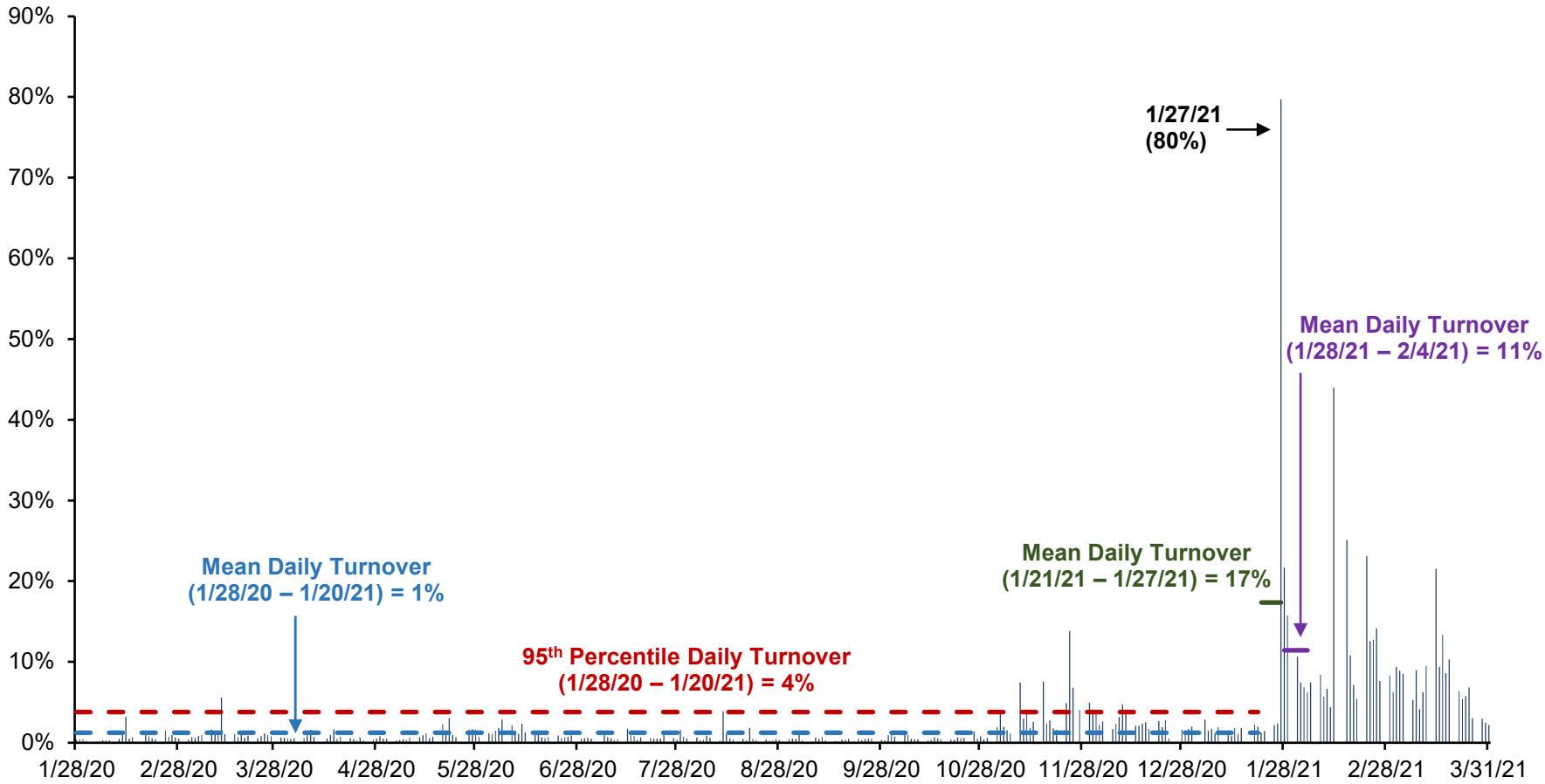
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5H
Tootsie Roll Industries Inc.
Daily Turnover Ratio
1/28/20 – 3/31/21



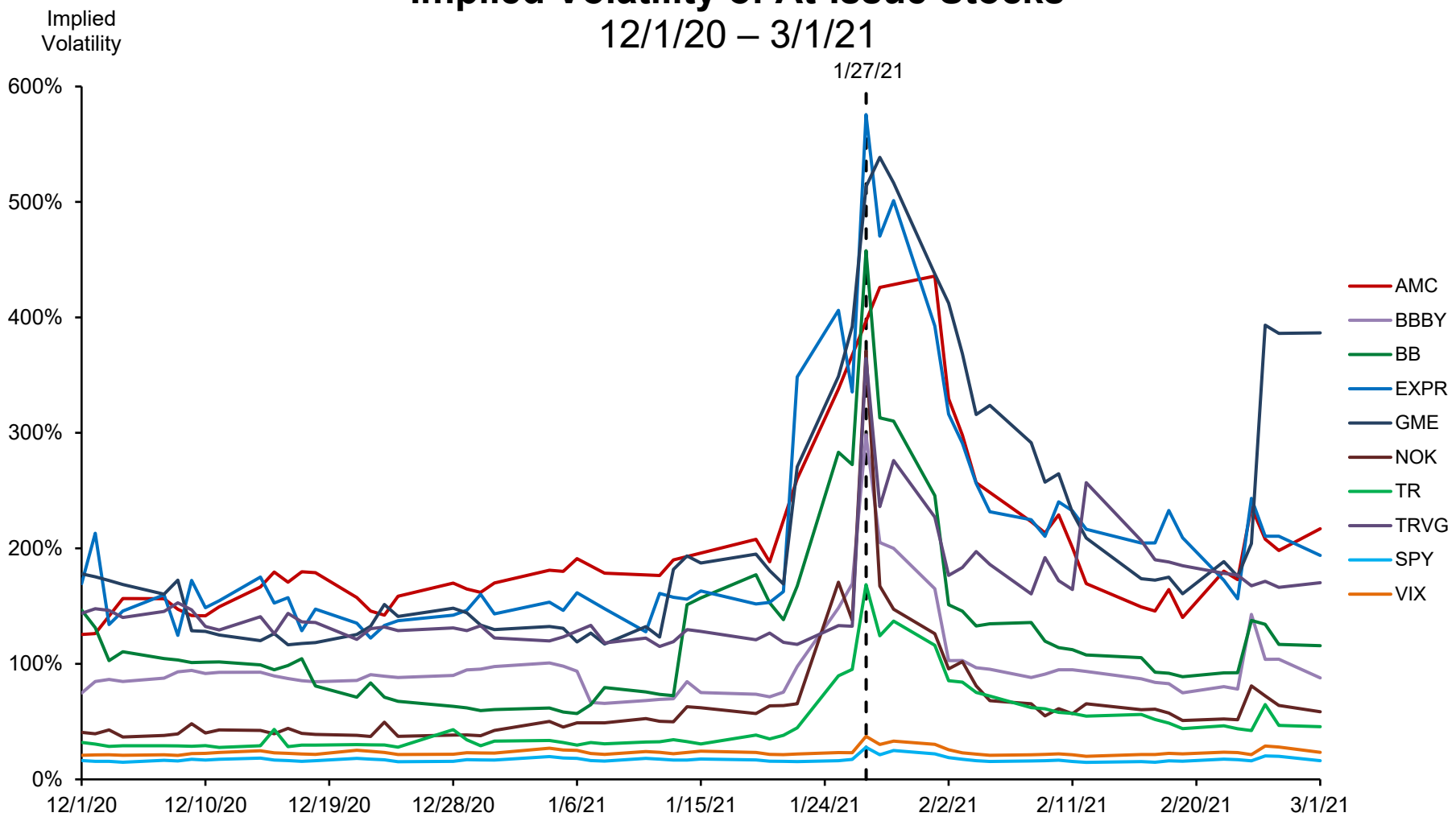
Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 5l
trivago N.V.
Daily Turnover Ratio
1/28/20 – 3/31/21



Source: *CRSP*
Note: The Daily Turnover Ratio is calculated as the daily volume divided by the shares outstanding on that day. The volume is unadjusted.

Exhibit 6
Implied Volatility of At-Issue Stocks
12/1/20 – 3/1/21



Source: Refinitiv Eikon; "Cboe VIX Index," *Cboe*, available at https://www.cboe.com/tradable_products/vix/; "SPY: The Original S&P 500 ETF," *State Street Global Advisors*, available at https://www.ssga.com/us/en/intermediary/etfs/capabilities/spdr-core-equity-etfs/spy-sp-500

Note: The implied volatility charted is the 30-day at-the-money call option implied volatility. Implied volatility data for options is unavailable for Koss. Implied volatility of SPY and VIX are included for comparison. SPY is an exchange-traded fund designed to track the S&P 500 stock market index. VIX is the CBOE Volatility Index, a measure of volatility expectations based on S&P 500 options.

Exhibit 7
Selected Analyst Commentary on Disconnect Between Prices and Fundamentals January 21, 2021 – March 31, 2021

Telsey Advisory Group (January 25, 2021)

In our view, GameStop's share price increase of ~333% in the past three months—and a tenfold increase of ~970% since our upgrade to Outperform on September 14, 2020 at $6.09—far exceeds our high fundamental expectations. …[1]

UBS (January 25, 2021)

With BBBY shares up 73% YTD, our call is to take profits. The recent move has tilted the risk-reward to the downside. … BBBY 25x multiple is several standard deviations above its 5-yr average of 9x. One can justify the stock trading at a premium valuation if there was more proof of its progress (BBY trades at 15.6x CY'22 & DKS is at 13.6x CY'22). As evidence of the challenges emerge moving through the summer, we think it will act as an overhang on the stock.[2]

Raymond James (January 26, 2021)

… BBBY is up ~73% through the first ~15 trading days of 2021, without any meaningful change in the retail environment or fundamentals of the business (versus a month ago).[3]

Royal Bank of Canada (January 26, 2021)

We are downgrading shares of BlackBerry from Sector Perform to Underperform. Our downgrade reflects: 1) the rally in BlackBerry's shares pushes valuation to multi-year highs and above peers; 2) the fundamental outlook for BlackBerry's UEM/Cylance businesses has not materially changed; and 3) the probability of an unannounced IP licensing gain appears low. Our $7.50 price target is unchanged and implies 58% downside for the shares.[4]

Wedbush (January 27, 2021)

Following an extraordinary two days of trading for BBBY (and other names with high levels of short interest), with a peak trading price of $46.95 +55% from its Friday close ($30.21) on Monday, January 25, and a closing price of $36.87 on Tuesday, January 26, +22% since Friday,

[1] "GME - Downgrading to Underperform; Disconnect Between Fundamentals and Valuation," *Telsey Advisory Group*, January 25, 2021.
[2] "Stepping Back and Sitting Down – Downgrade to Sell," *UBS*, January 25, 2021.
[3] "Taking a Breather For Now; Downgrading to Market Perform," *Raymond James*, January 26, 2021.
[4] "Downgrading to Underperform," *Royal Bank of Canada*, January 26, 2021.

Exhibit 7
Selected Analyst Commentary on Disconnect Between Prices and Fundamentals January 21, 2021 – March 31, 2021

we are removing BBBY from Wedbush's Best Idea List and downgrading our rating from OUTPERFORM to NEUTRAL. We continue to see high potential for BBBY's transformation, but believe the stock is ahead of itself and the sharp move higher is unsustainable.[5]

Scotiabank (January 27, 2021)

Our view is that the move in BlackBerry's shares appears to be overdone in the short-term given fundamentals of the business relative to the movement in the underlying share price.[6]

BofA Securities (January 28, 2021)

We are downgrading BBBY to Neutral from Buy following a significant increase in share price and valuation. Since Jan. 21 shares have risen 97% (vs. -2.7% for the S&P500). With no significant news specific to the company announced or changes in consensus earnings, the increase in share price appears to be driven solely by a short squeeze (64% of shares were short at YE20) and high retail enthusiasm.[7]

ABG Sundal Collier (January 28, 2021)

Over the last five days Nokia shares are up by more than 30% on materially higher-than-average trading volumes, mainly driven by US retail investors buying shares on the recommendations of online trading platforms. We have seen no company-specific or market-related developments that would warrant such a reaction in the shares, which does not appear to be fundamentally based.[8]

Telsey Advisory Group (January 28, 2021)

Downgrading Shares of Bed Bath & Beyond to Market Perform from Outperform: In our view, Bed Bath & Beyond's share price increase of ~120% in the past three months—and up ~150% since our upgrade to Outperform on October 29, 2020 at $21.10—far exceeds

[5] "Downgrade to NEUTRAL; Opportunity Remains but Stock Is Ahead of Itself," *Wedbush*, January 27, 2021.
[6] "Lowering Recommendation on Significant Market Move," *Scotiabank*, January 27, 2021.
[7] "Still See a Great Turnaround Taking Shape but Big Price Move Takes Us to Neutral," *BofA Securities*, January 28, 2021.
[8] "Sell on Retail Hype," *ABG Sundal Collier*, January 28, 2021.

Exhibit 7
Selected Analyst Commentary on Disconnect Between Prices and Fundamentals January 21, 2021 – March 31, 2021

our high fundamental expectations and projected multi-year benefits from the company's transformation. In fact, the recent increase in the share price has raised the company's EV/EBITDA (NTM) valuation multiple to ~17x, according to FactSet, which is well above its 10-year average of ~7x and 10-year peak of 8x (pre-2020).[9]

Telsey Advisory Group (January 28, 2021)

To be clear, we like the turnaround story at Bed Bath & Beyond, but the share price seems to have gotten ahead of itself. To some extent, the company is still a "show-me" story in the early stages of transformation. … We also expect meaningful improvement as the company rolls out new private label brands, closes underperforming stores (~120 stores in 2020; ~80 in 2021), begins a store remodel program in 2021, launches/expands the new Bed Bath & Beyond app, and enhances digital capabilities, among other initiatives. … That said, we believe these transformational trends are more than fully reflected in the stock price at the current valuation.[10]

Avise Analytics (February 1, 2021)

GameStop … , a stock that was struggling after hitting historic lows of under $4 per unit since past two years, has witnessed an almost miraculous resurgence … [from a stock price of] $18 a few weeks ago to an unbelievable high of $347.51, before closing the day at $193.60, a 900 percent increase in just a few weeks. The rally … is raising concerns about issues such as stock bubble, overzealous trading, investor protection, market manipulation.[11]

MKM Partners (February 1, 2021)

In our view, the recent volatility and spike in the company's stock, thanks to the Reddit/WallStreetBets crowd, has decoupled AMC's share price and its valuation. … The emotion behind the #SaveAMC movement could carry the shares higher in the near-term, but we believe this valuation-be-damned momentum is not sustainable over the long term.[12]

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[9] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.
[10] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.
[11] "Gaming Out the Rise of GameStop," *Avise Analytics*, February 1, 2021.
[12] "Dowgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021.

Exhibit 7
Selected Analyst Commentary on Disconnect Between Prices and Fundamentals January 21, 2021 – March 31, 2021

Credit Suisse (February 1, 2021)

… [Robinhood's] actions likely protected its clients given that the securities [for which Robinhood imposed PCO restrictions] were misvalued. …[13]

BofA Securities (February 4, 2021)

In our last note, we argued that while [GameStop] shares do not appear to be trading on fundamentals (which are very challenged) they should in time, and many of the turnaround opps touted by bulls may not materialize. It is difficult to predict the day-to-day moves of GME shares but they are down 81% from highs and several factors that we believe have been instrumental in increasing share price (such as daily volume, short interest and online conversations) appear to be turning. We think fundamentals will again factor into valuation and note that at current price of $92 and GME's 5yr avg EV/EBITDA of 3.7x, the implied EBITDA is $1.6bn vs. $(65)mn in '20. We maintain Underperform and $10 PO.[14]

BofA Securities (February 4, 2021)

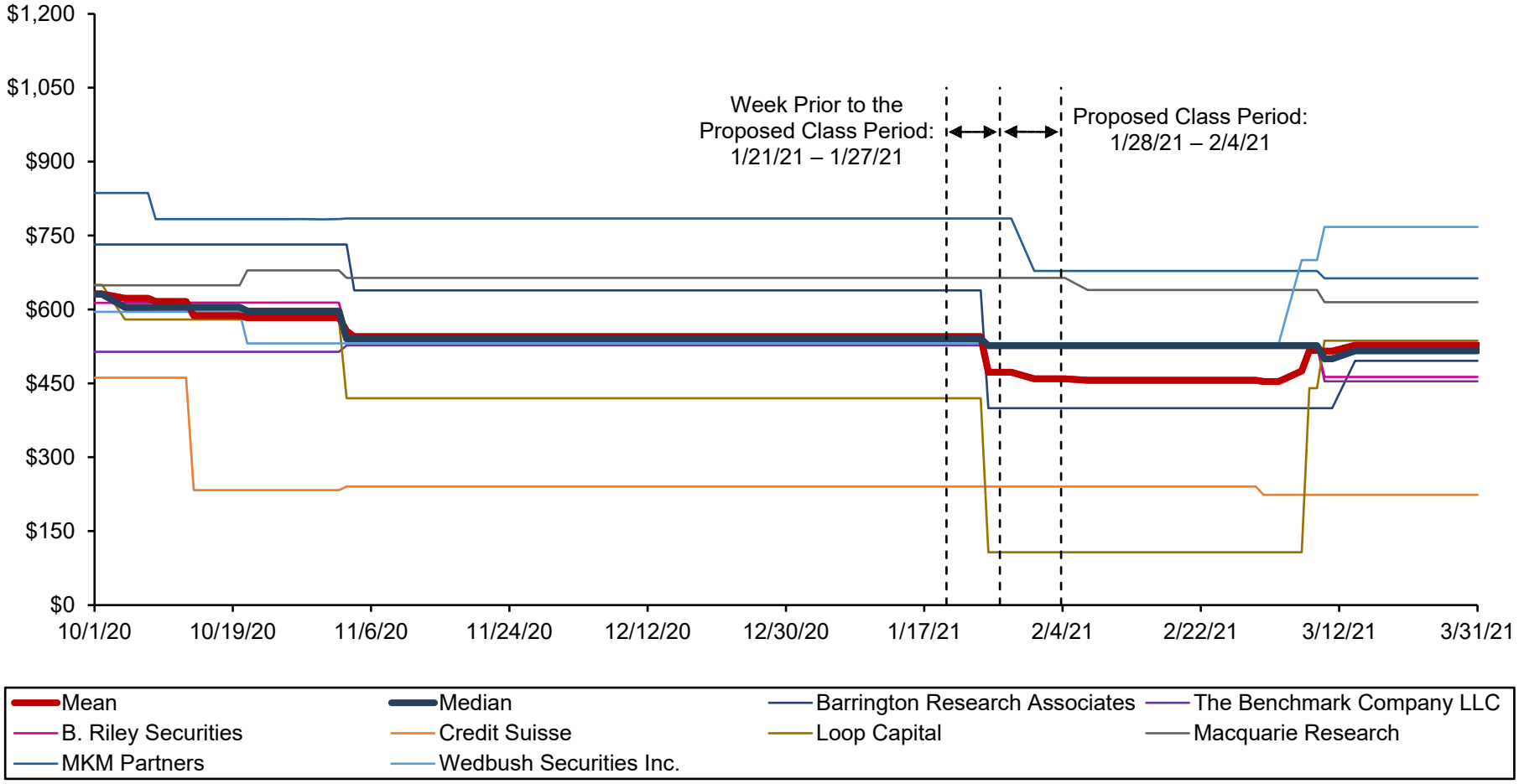
… [T]raditional fundamentals are not currently driving GME shares (up 422% since GME reported disappointing Holiday numbers). …[15]

Wedbush (March 15, 2021)

… [M]id-January brought outsized share gains in AMC, with some sympathy trading in competitor shares late-January, driven by momentum unrelated to the company's fundamentals.[16]

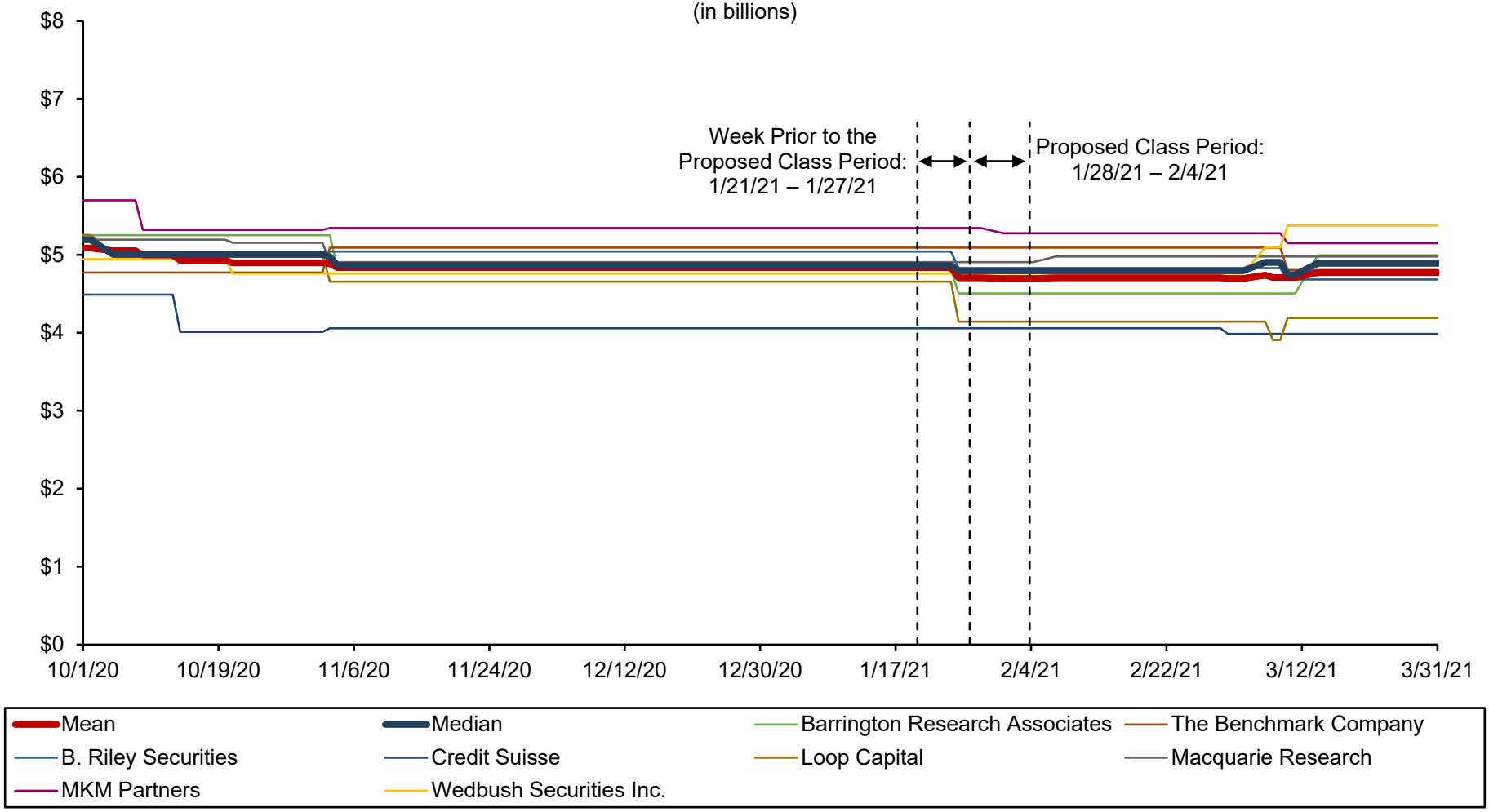
[13] "US Online Brokers: Heightened Activity in Certain Stocks (AMC, GME) and the Impact on Brokers (SCHW, IBKR)," *Credit Suisse*, February 1, 2021. Note that this Credit Suisse report is discussing all thirteen stocks for which Robinhood imposed PCO restrictions, and is not specific to just GameStop.
[14] "When Fundamentals Still Appear on the Sidelines, What Other Factors Matter," *BofA Securities*, February 4, 2021.
[15] "When Fundamentals Still Appear on the Sidelines, What Other Factors Matter," *BofA Securities*, February 4, 2021.
[16] "Movies and Entertainment: Now Playing - Wedbush at the Movies," *Wedbush*, March 15, 2021.

Exhibit 8A
AMC Entertainment Holdings, Inc.
FY22 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



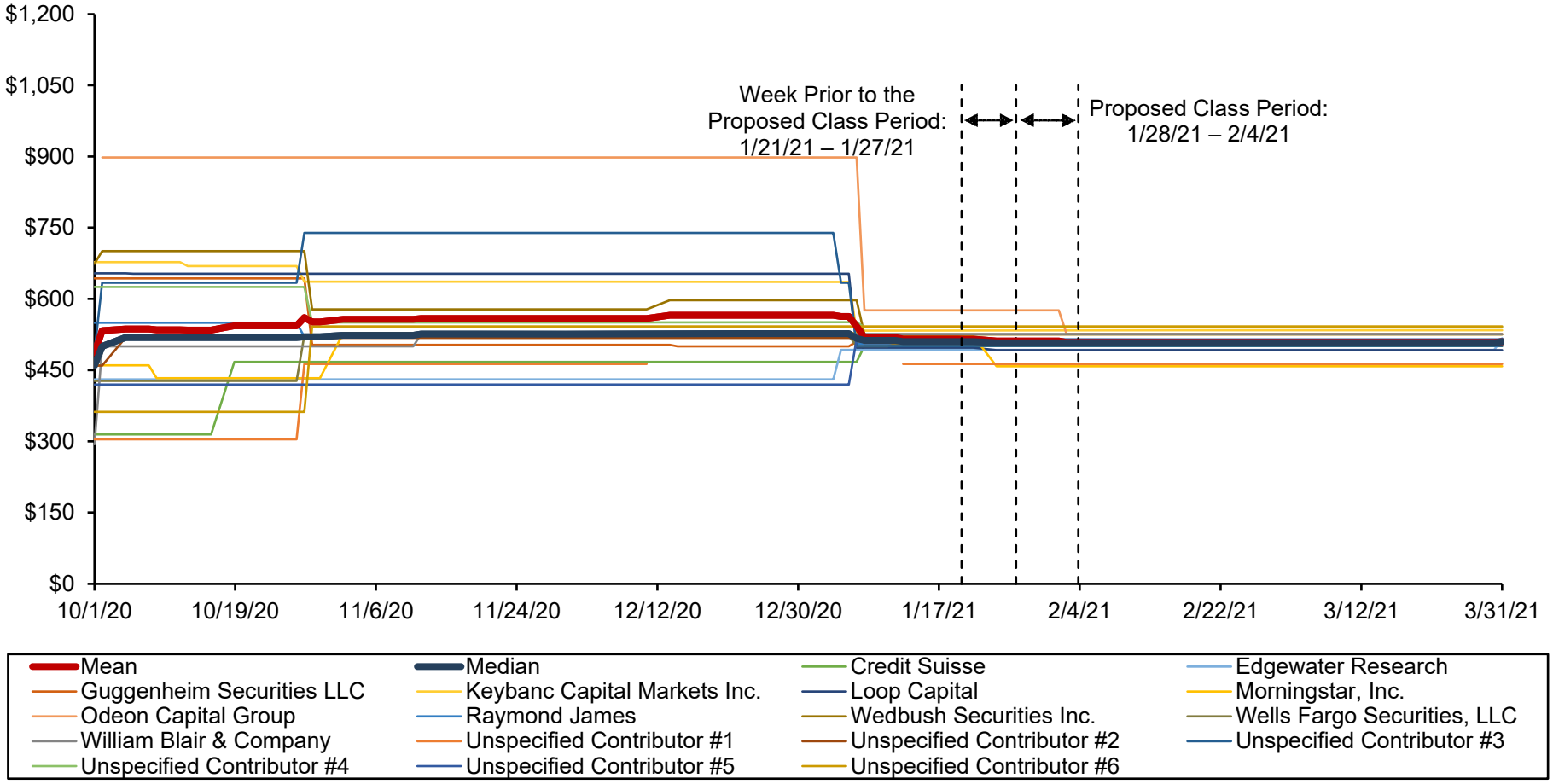
Source: Refinitiv Eikon; Complaint dated 1/17/23; AMC Entertainment Holdings, Inc., Form 10-K, filed March 1, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. FY22 forecasts are shown for the fiscal year ending 12/31/22.

Exhibit 8B
AMC Entertainment Holdings, Inc.
FY22 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



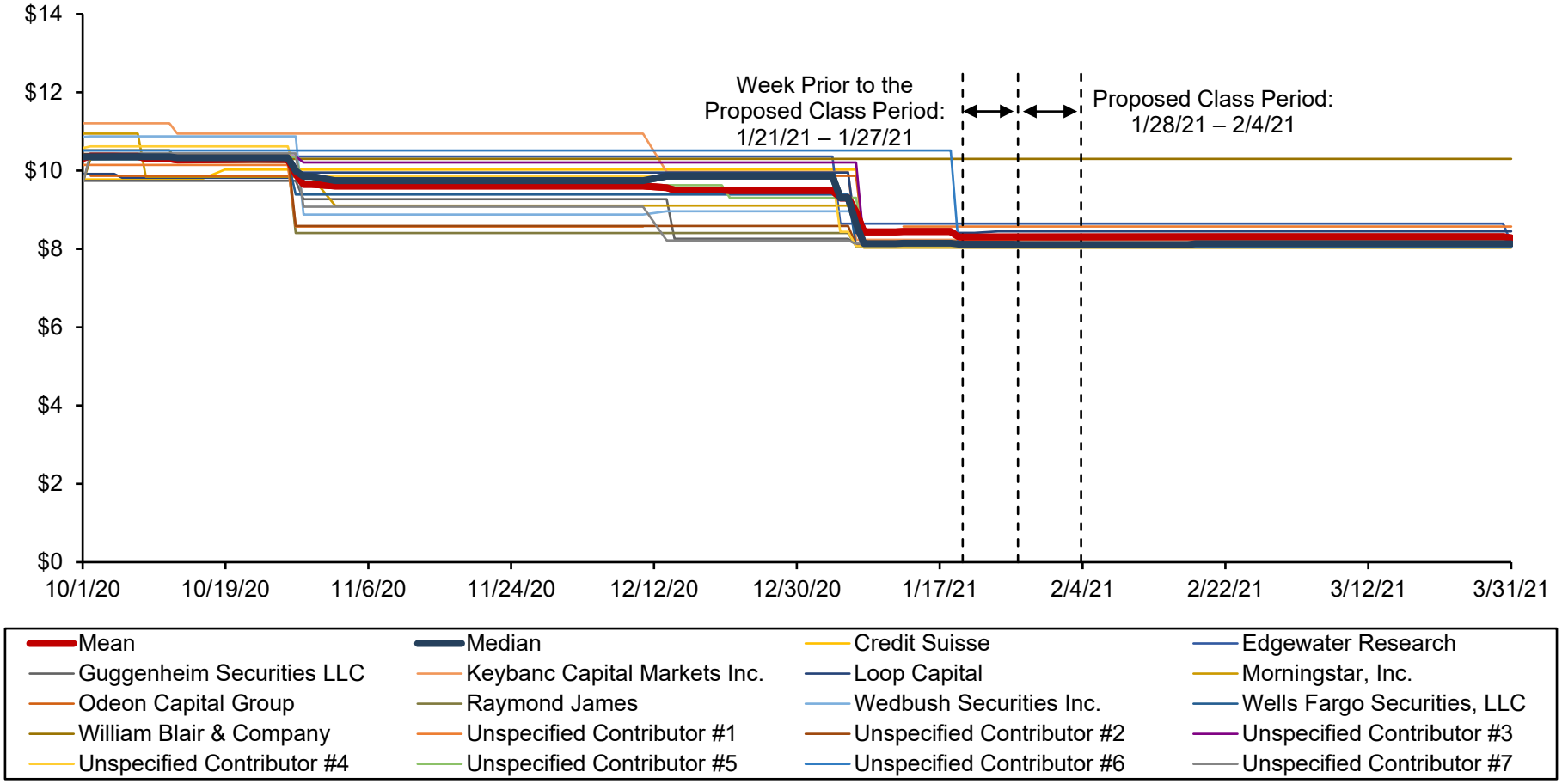
Source: Refinitiv Eikon; Complaint dated 1/17/23; AMC Entertainment Holdings, Inc., Form 10-K, filed March 1, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. FY22 forecasts are shown for the fiscal year ending 12/31/22.

Exhibit 8C
Bed Bath & Beyond, Inc.
FY21 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



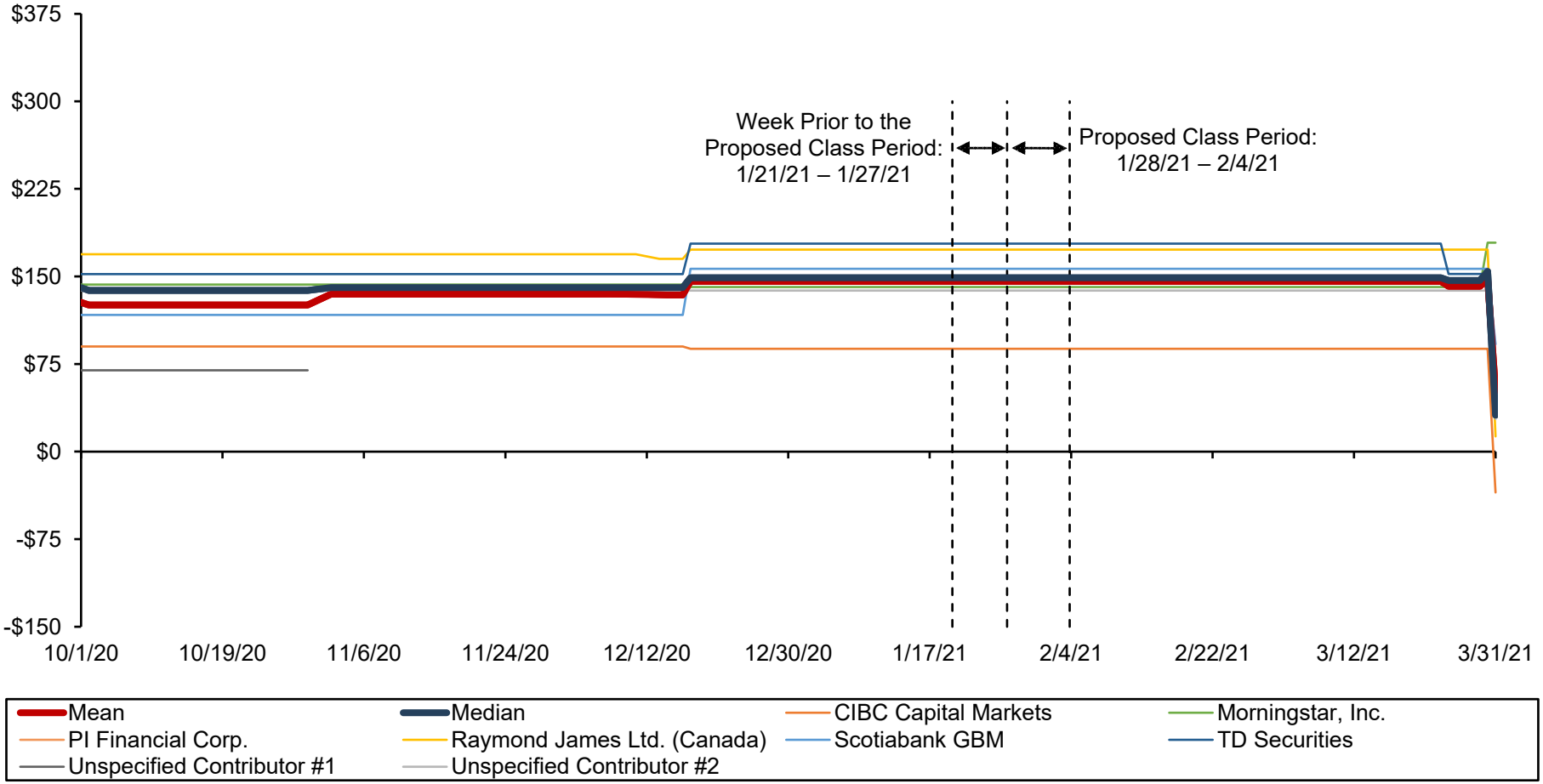
Source: Refinitiv Eikon; Complaint dated 1/17/23; Bed Bath & Beyond, Inc., Form 10-K, filed April 21, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY21 forecasts are shown for the fiscal year ending 2/26/22.

Exhibit 8D
Bed Bath & Beyond, Inc.
FY21 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



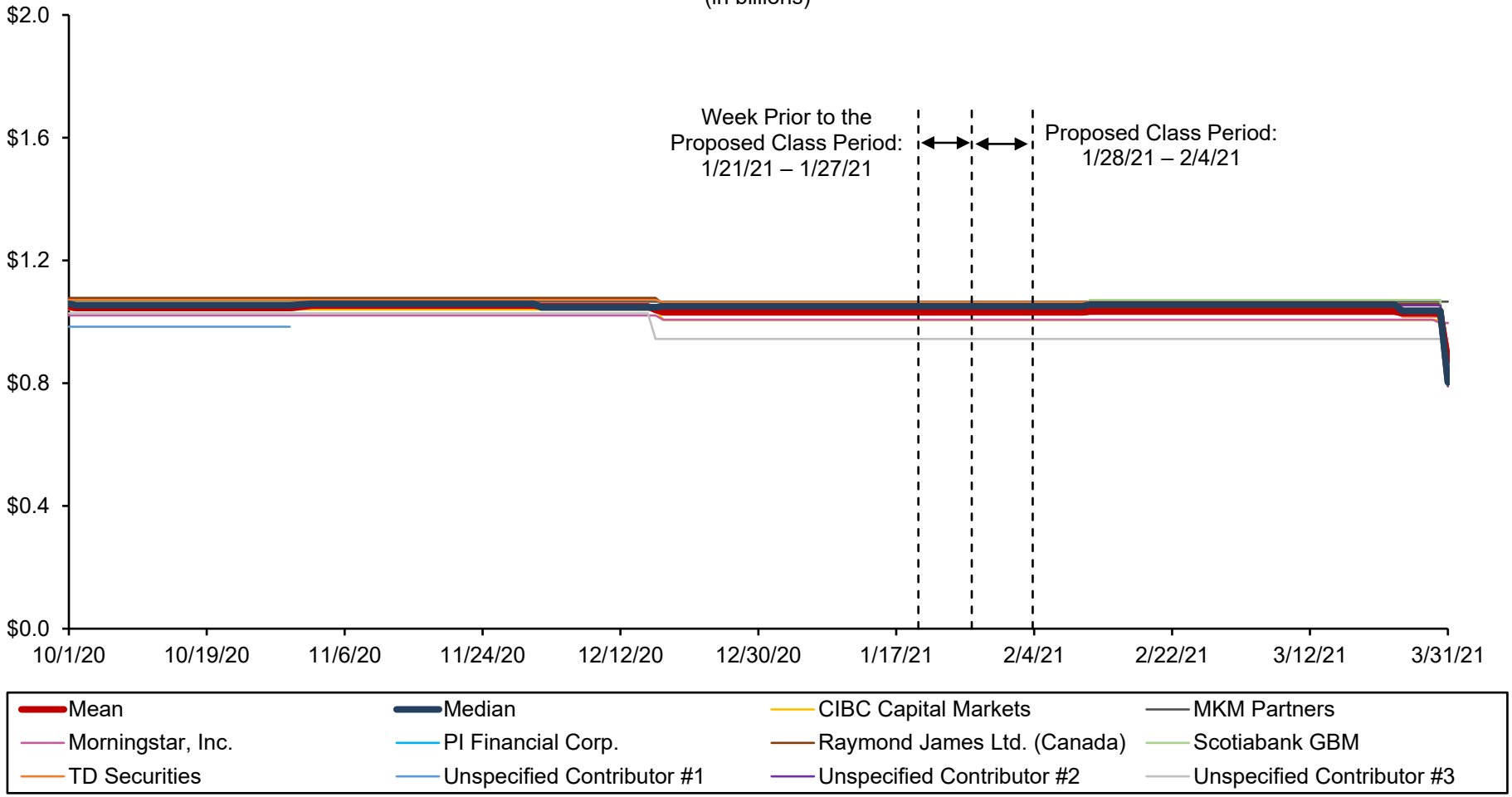
Source: Refinitiv Eikon; Complaint dated 1/17/23; Bed Bath & Beyond, Inc., Form 10-K, filed April 21, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY21 forecasts are shown for the fiscal year ending 2/26/22.

Exhibit 8E
BlackBerry Limited
FY22 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



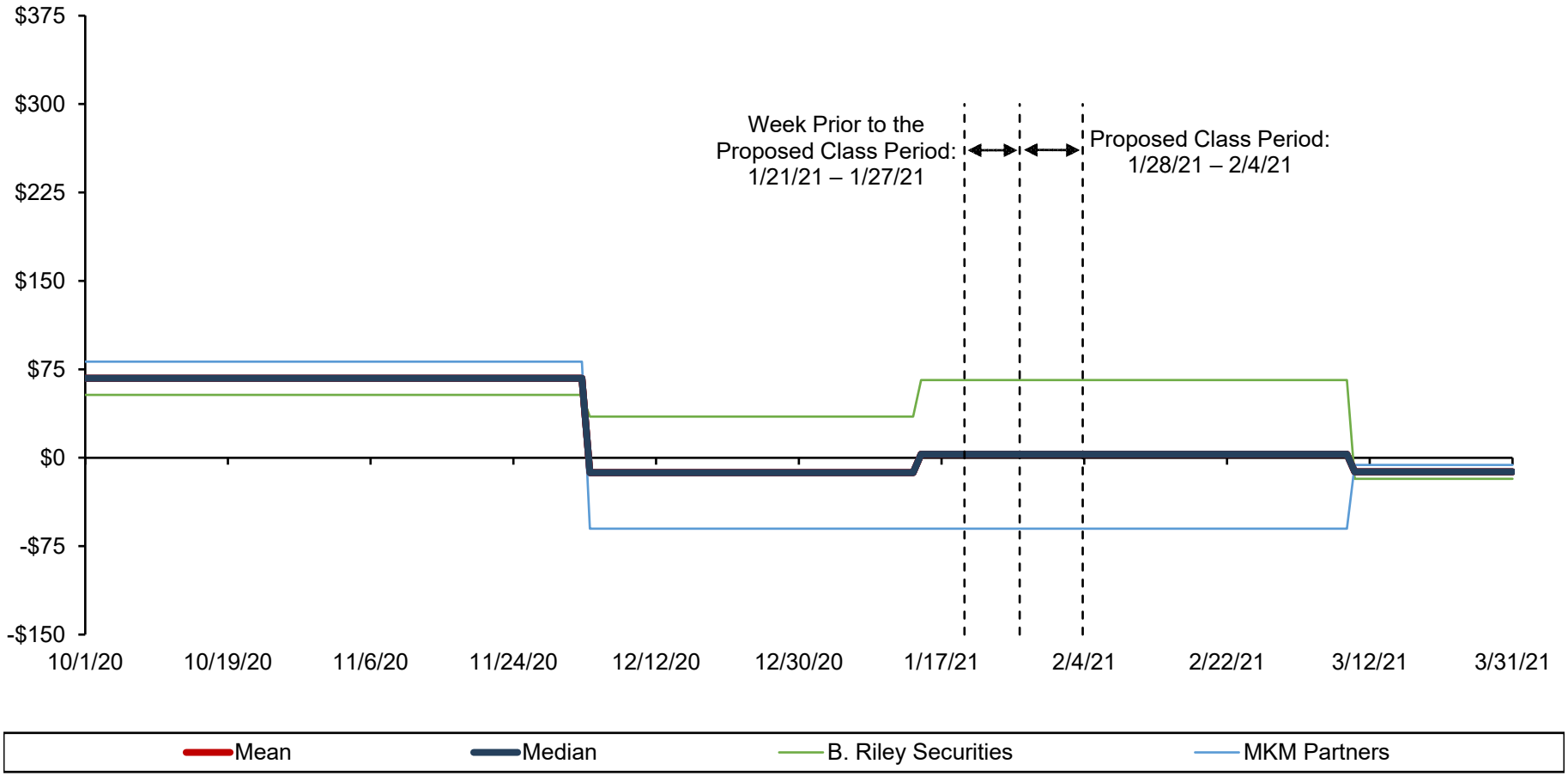
Source: Refinitiv Eikon; Complaint dated 1/17/23; BlackBerry Limited, Form 10-K, filed April 1, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for the fiscal year ending 2/28/22.

Exhibit 8F
BlackBerry Limited
FY22 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



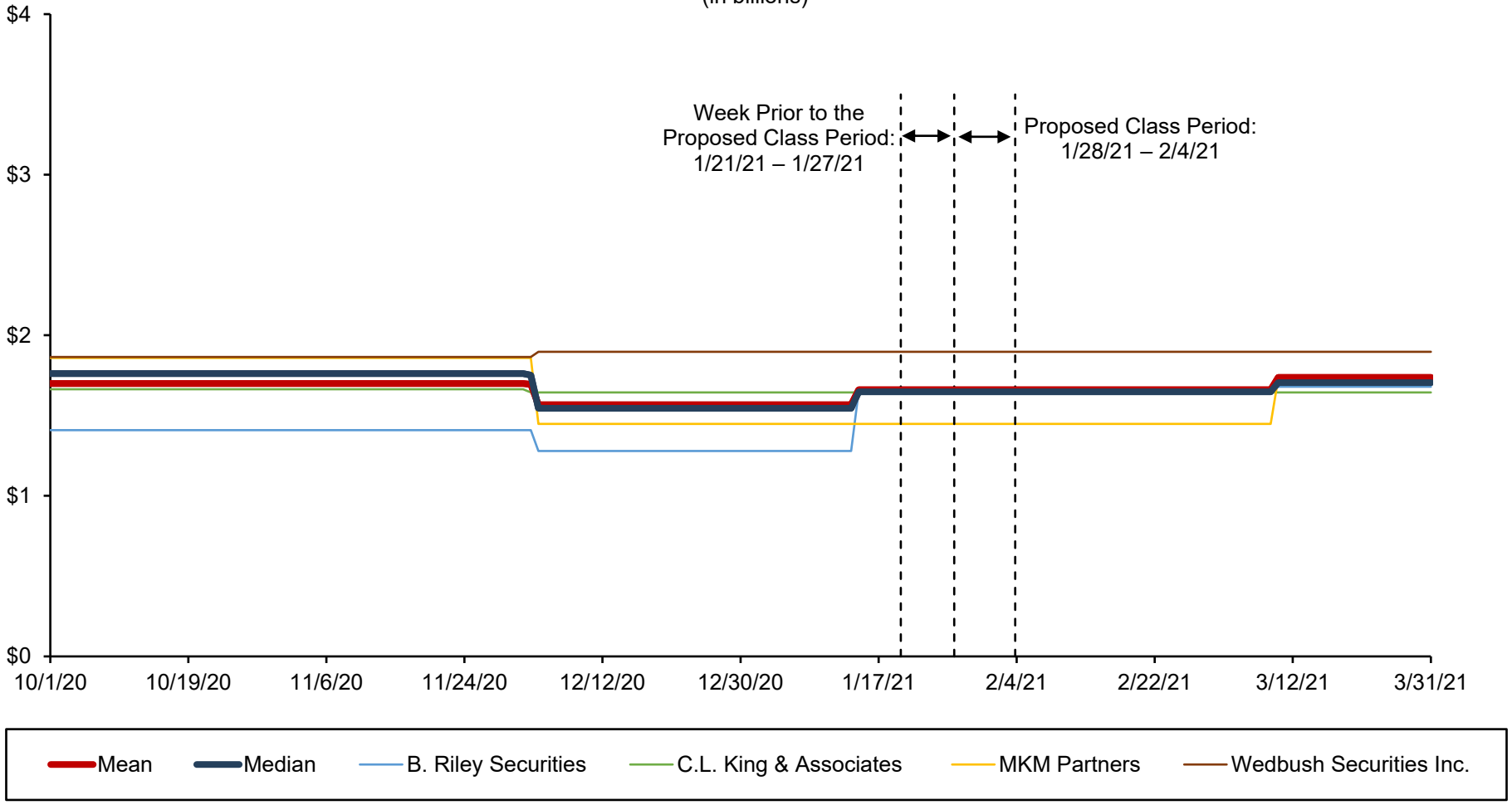
Source: Refinitiv Eikon; Complaint dated 1/17/23; BlackBerry Limited, Form 10-K, filed April 1, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for the fiscal year ending 2/28/22.

Exhibit 8G
Express, Inc.
FY21 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



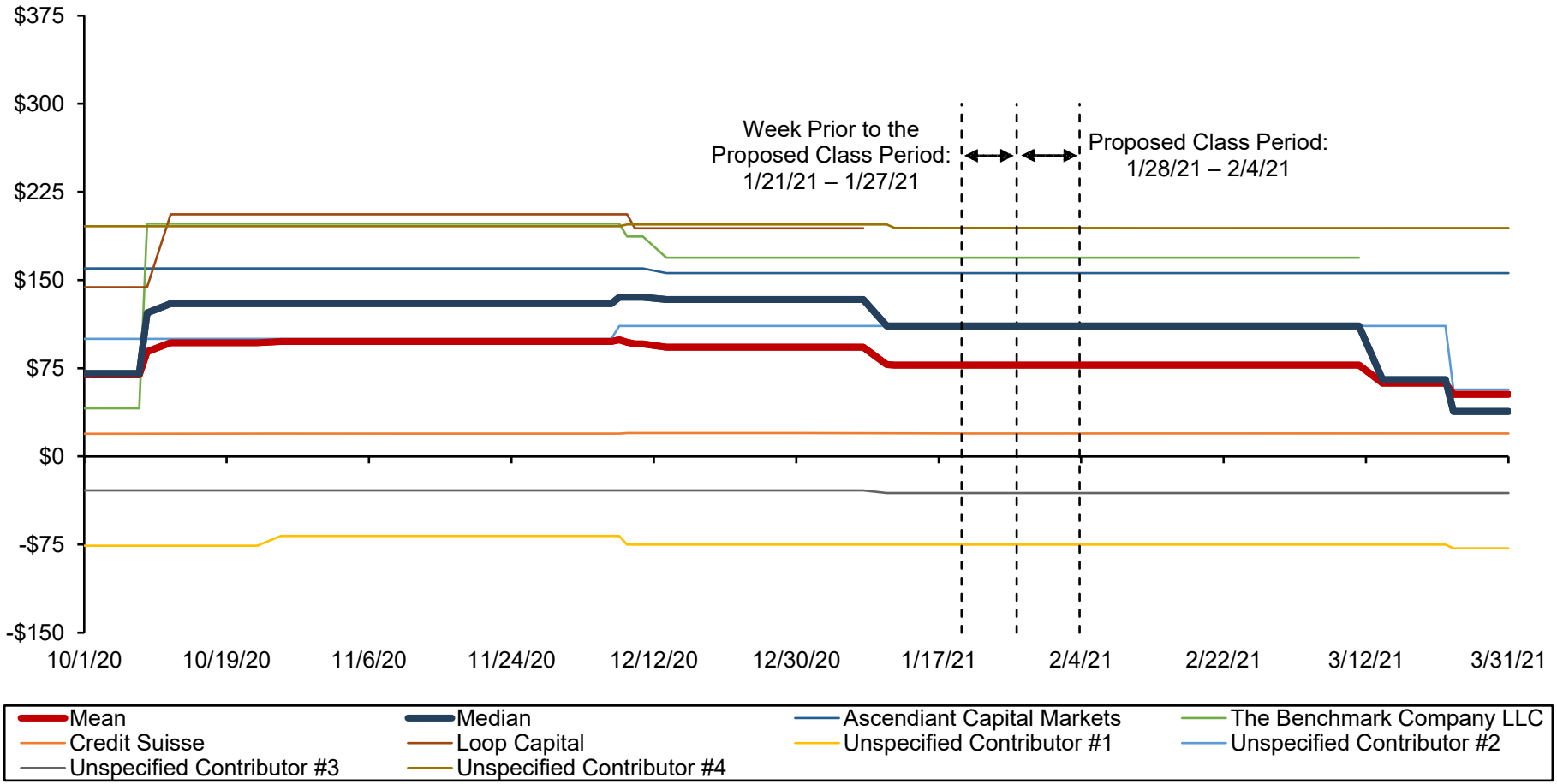
Source: Refinitiv Eikon; Complaint dated 1/17/23; Express, Inc., Form 10-K, filed March 24, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. FY21 forecasts are shown for the fiscal year ending 1/29/22.

Exhibit 8H
Express, Inc.
FY21 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



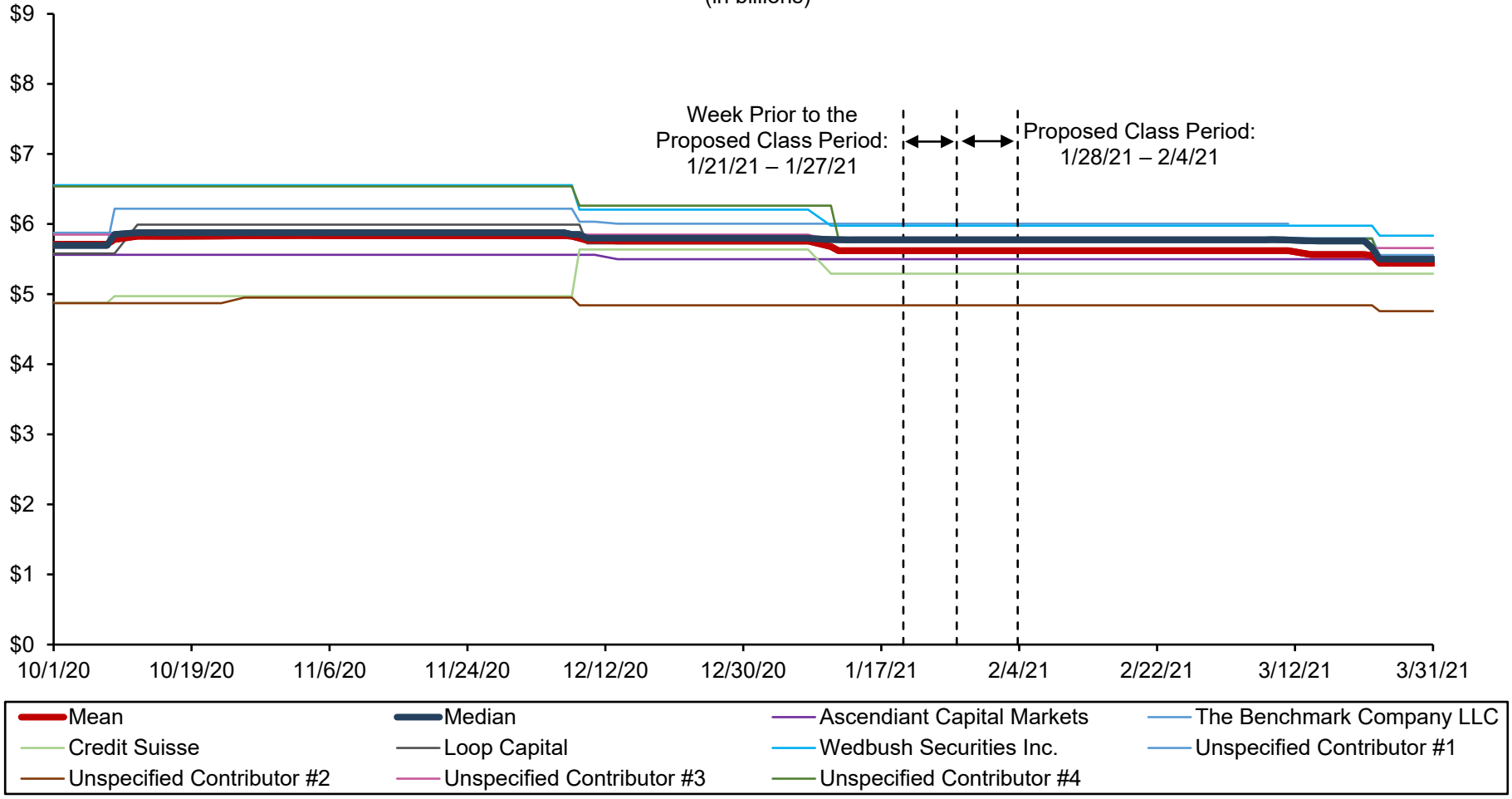
Source: Refinitiv Eikon; Complaint dated 1/17/23; Express, Inc., Form 10-K, filed March 24, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. FY21 forecasts are shown for the fiscal year ending 1/29/22.

Exhibit 8I
GameStop Corp.
FY21 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



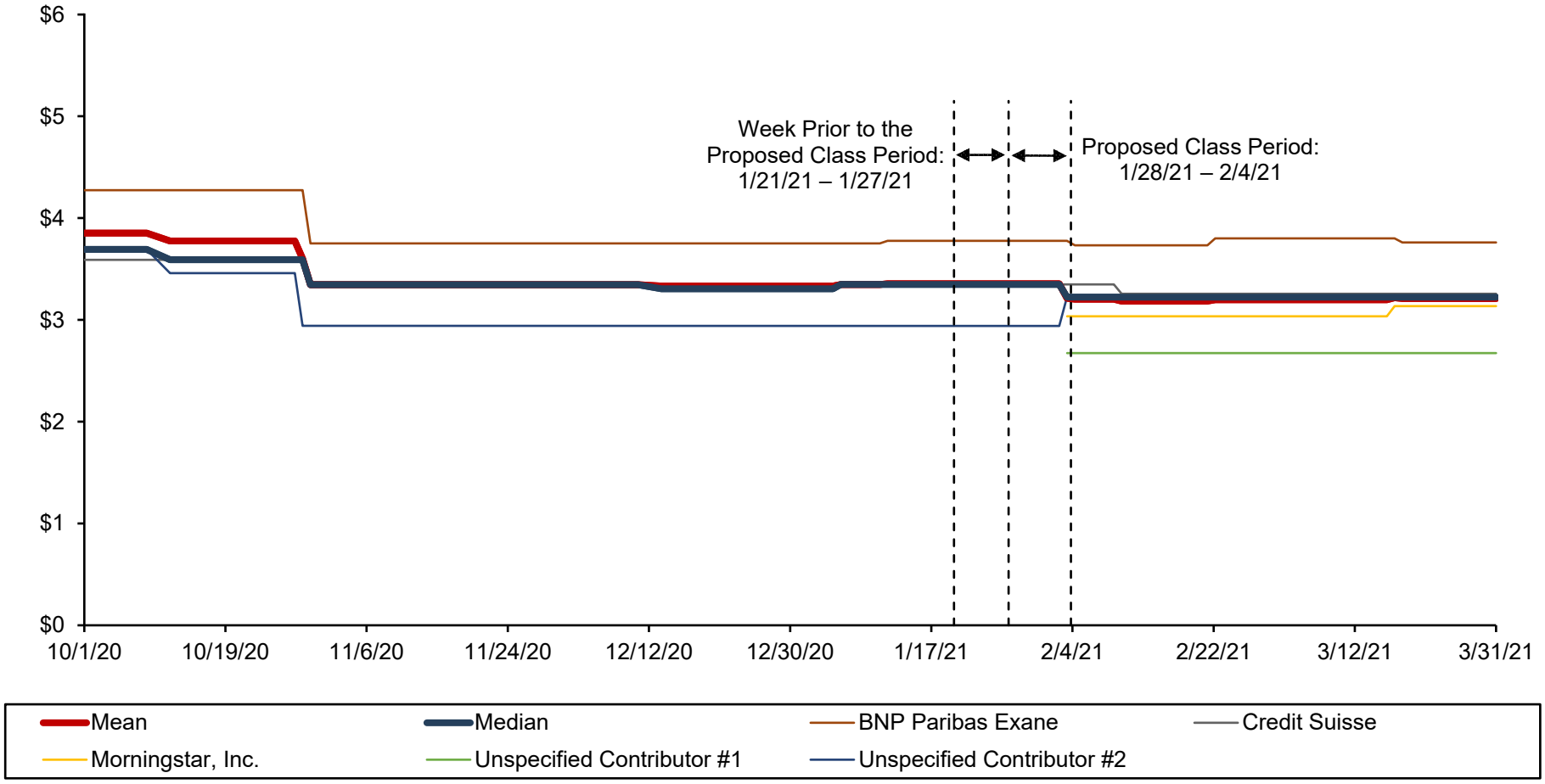
Source: Refinitiv Eikon; Complaint dated 1/17/23; GameStop Corp., Form 10-K, filed March 17, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY21 forecasts are shown for the fiscal year ending 1/29/22.

Exhibit 8J
GameStop Corp.
FY21 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



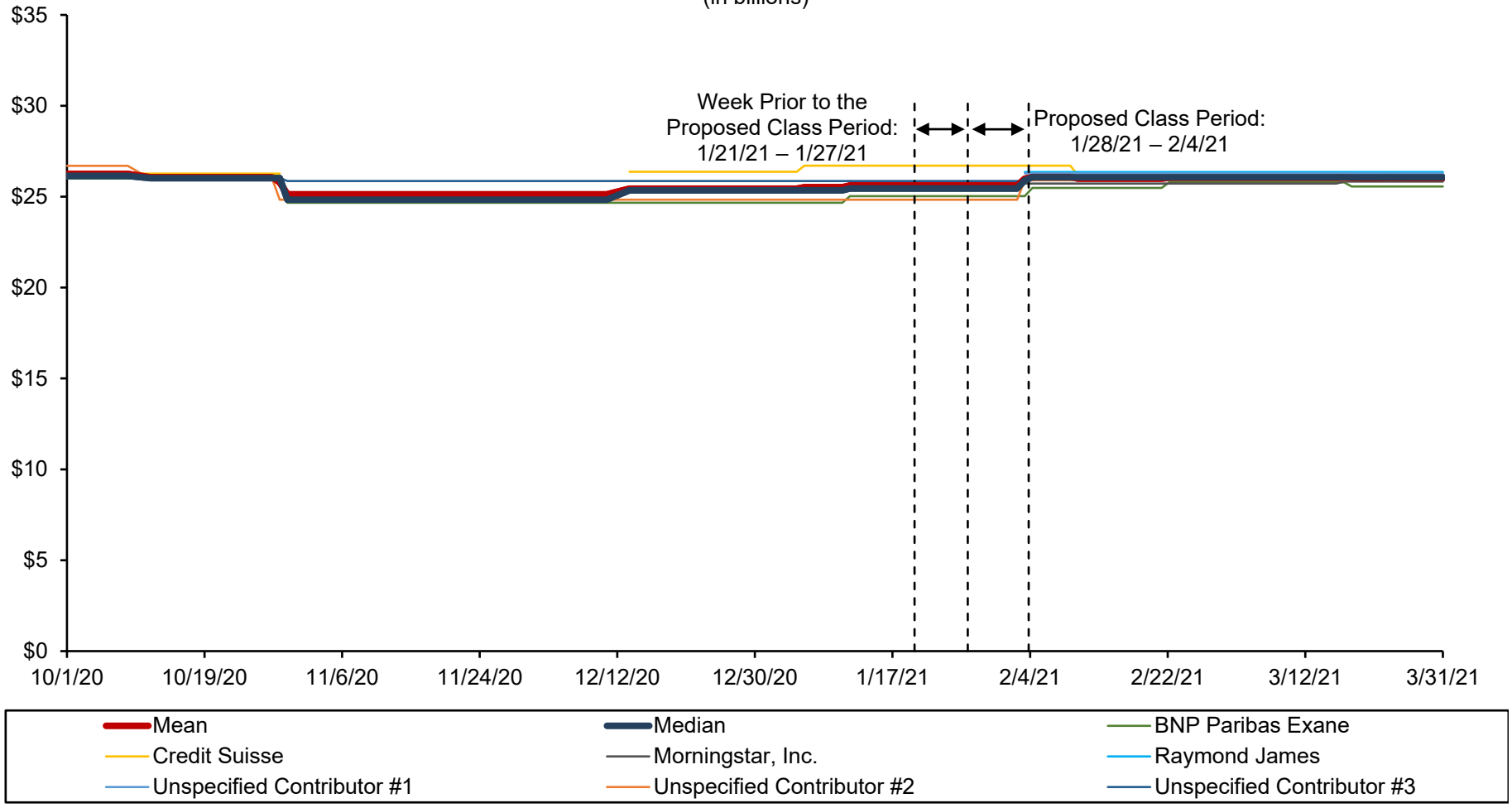
Source: Refinitiv Eikon; Complaint dated 1/17/23; GameStop Corp., Form 10-K, filed March 17, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY21 forecasts are shown for the fiscal year ending 1/29/22.

Exhibit 8K
Nokia Corporation
FY22 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in billions)



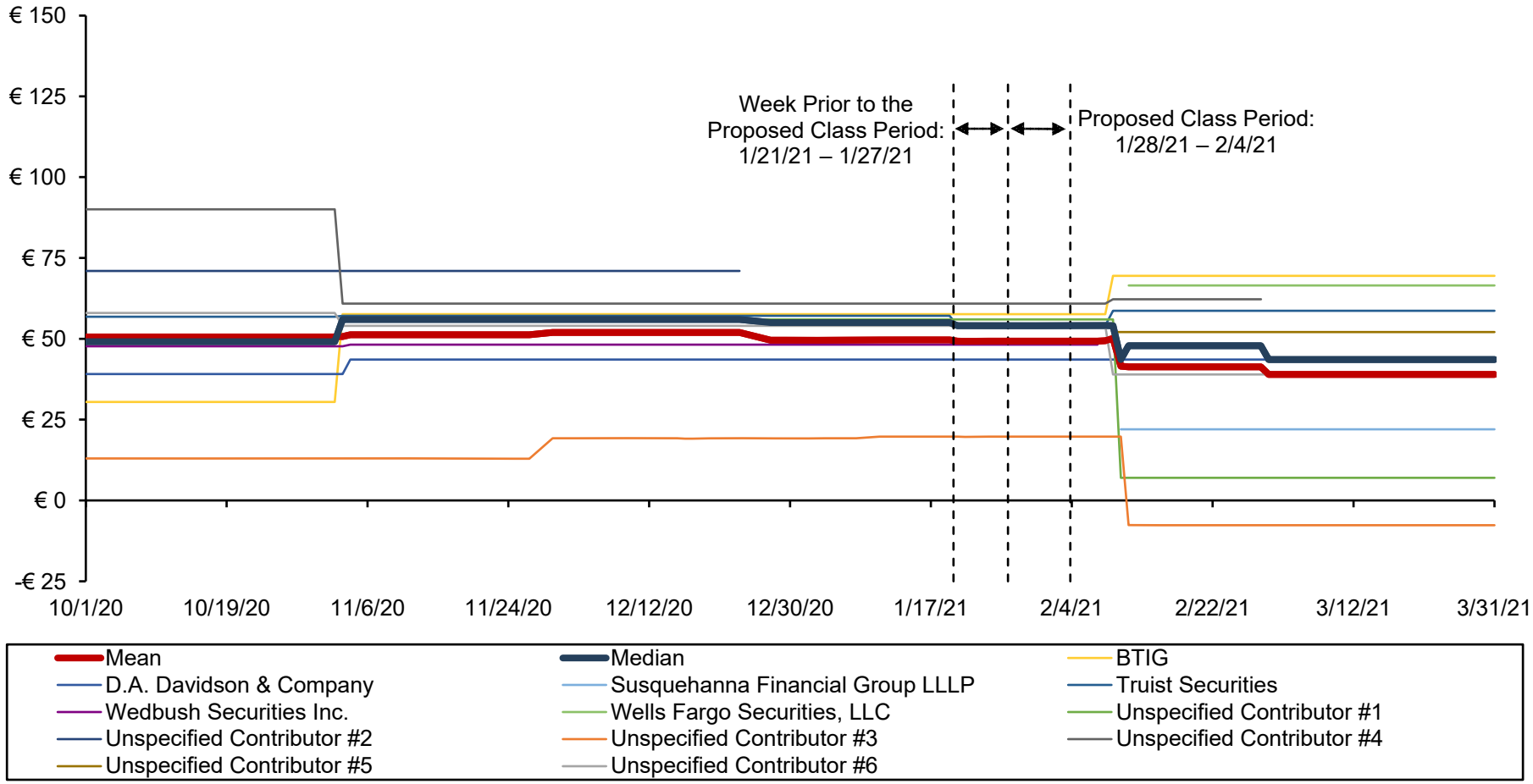
Source: Refinitiv Eikon; Complaint dated 1/17/23; Nokia Corporation, Form 20-F, filed March 3, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for the fiscal year ending 12/31/22.

Exhibit 8L
Nokia Corporation
FY22 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



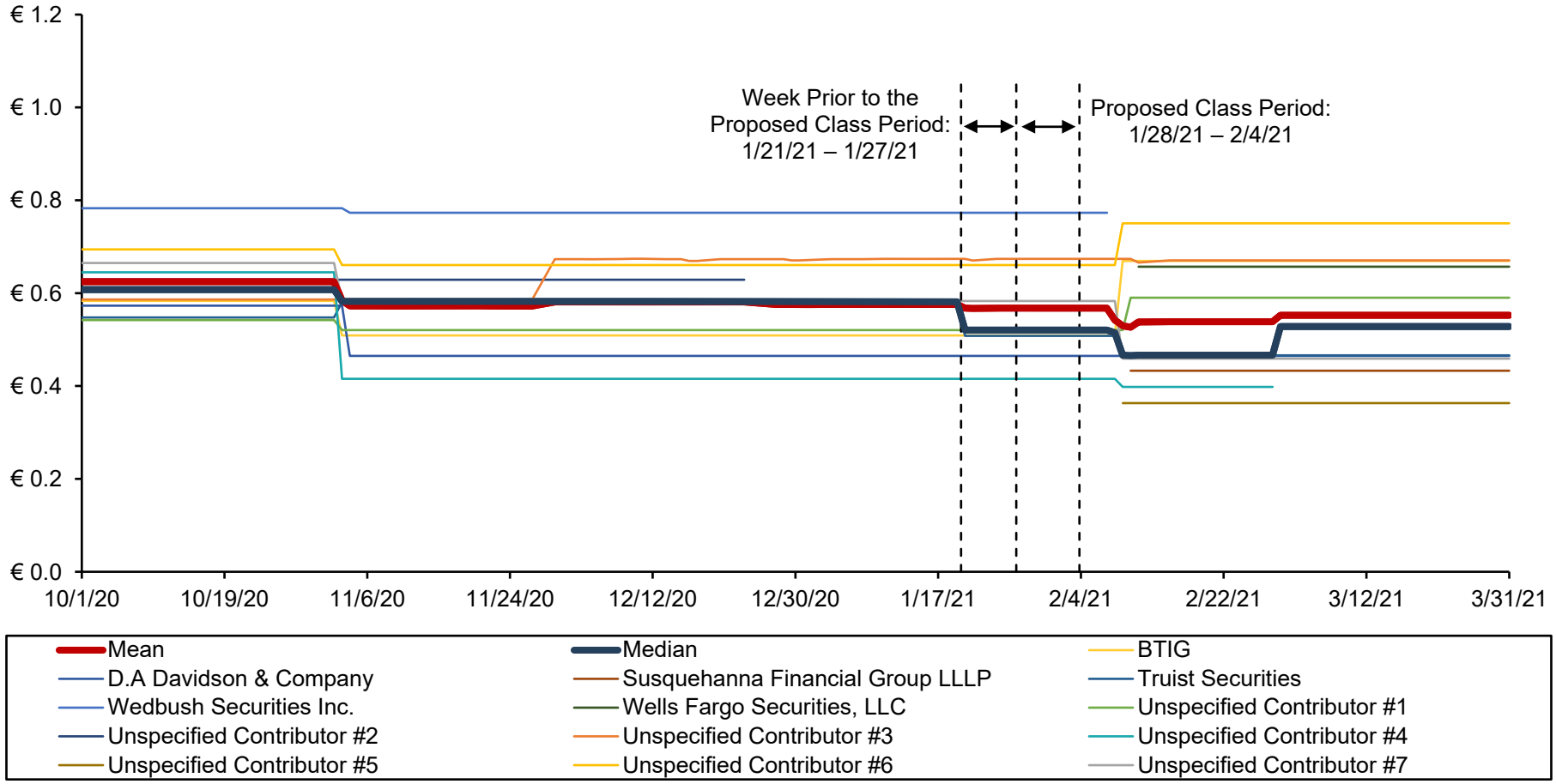
Source: Refinitiv Eikon; Complaint dated 1/17/23; Nokia Corporation, Form 20-F, filed March 3, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for the fiscal year ending 12/31/22.

Exhibit 8M
trivago N.V.
FY22 Analyst EBITDA Forecasts
10/1/20 – 3/31/21
(in millions)



Source: Refinitiv Eikon; Complaint dated 1/17/23; trivago N.V., Form 20-F, filed March 4, 2022
Note: Analyst EBITDA forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for fiscal year ending 12/31/22. Refinitiv Eikon analyst forecasts for Trivago are reported in Euros.

Exhibit 8N
trivago N.V.
FY22 Analyst Revenue Forecasts
10/1/20 – 3/31/21
(in billions)



Source: Refinitiv Eikon; Complaint dated 1/17/23; trivago N.V., Form 20-F, filed March 4, 2022
Note: Analyst revenue forecasts are shown as reported by Refinitiv Eikon. "Unspecified Contributor" refers to contributors in Refinitiv Eikon that are listed anonymously. FY22 forecasts are shown for the fiscal year ending 12/31/22. Refinitiv Eikon analyst forecasts for Trivago are reported in Euros.

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Barron's (January 25, 2021)

I'd be remiss if I didn't mention the wild moves in stocks like GameStop (GME) and BlackBerry (BB), which soared as much as 145% and 48%, respectively, before finishing the day up 18% and 28%. Such moves are hard to explain, and certainly aren't based on fundamentals. But they do get folks worried about a "bubble" in the stock market. …[1]

Business Insider (January 25, 2021)

Names like GameStop, BlackBerry, and AMC Entertainment have soared … with little fundamental news behind the moves. … Shares of GameStop soared as much as 145% in Monday trading on no apparent news.[2]

Financial Times (January 25, 2021)

… GameStop jumped as much as 120 per cent and its stock was repeatedly halted to calm volatile trading, before falling back to close 18 per cent higher. The outsized gains, without significant corporate news, built on a rally on Friday that exceeded 100 per cent at its peak.[3]

Forbes (January 25, 2021)

"It doesn't make business sense," Doug Clinton, the cofounder of Loup Ventures, told Bloomberg Monday of GameStop's meteoric rise. "It makes sense from an investor psychology standpoint."[4]

New York Times (January 25, 2021)

Shares of companies like GameStop are becoming detached from the kinds of factors that traditionally help benchmark a company's valuation – like growth potential or profits. Analysts

[1] "GameStop's Surge Is Stoking Bubble Fears. Why It's Not Time to Worry," *Barron's Online*, January 25, 2021.
[2] "From AMC to Bed Bath & Beyond, the Market's Most-Shorted Stocks Are Rallying as Reddit Day-Traders Pile In," *Business Insider*, January 25, 2021.
[3] "GameStop and BlackBerry Shares Soar on Amateur Traders' Fervour," *Financial Times*, January 25, 2021.
[4] "GameStop Saga Continues As Reddit Users Battle Wall Street–Here's The Latest In The Wild 2,300% Stock Surge," *Forbes.com*, January 25, 2021.

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expect the company to report a loss from continuing operations of $465 million for 2020, on top of the $795 million it lost in 2019.[5]

Business Insider (January 26, 2021)

The findings come as a handful of stocks like GameStop, AMC Entertainment, and Bed Bath & Beyond are soaring hundreds of percentage points with little fundamental news behind the moves.[6]

Business Insider (January 26, 2021)

[Koss's] sudden and meteoric rise follows rallies in the share price of companies like GameStop, BlackBerry, and AMC Entertainment, which have surged hundreds of percentage points in recent weeks with little fundamental news behind the moves.[7]

Dow Jones Institutional News (January 26, 2021)

BlackBerry Ltd.
Security software and service provider BlackBerry is another stock with a notable short position finding support online from individual investors. Shares have climbed around 25% this week, leaving many analysts scratching their heads. The company said Monday it wasn't aware of any material developments or change in its business that would account for the recent jump.[8]

Dow Jones Institutional News (January 26, 2021)

So is GameStop worth 500% more than it was a week ago? Frankly, no, and this behavior is probably a sign of market froth. Few would argue GameStop's rally is about business fundamentals. The intrinsic value of shares might be hard to justify at these levels. The top target price on Wall Street is $33 a share.[9]

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[5] "An Explosive Rally in GameStop Shares Highlights the Small-Trader Frenzy in Financial Markets," *NYTimes.com Feed*, January 25, 2021.
[6] "Increased Retail Trading Is 'Largely Responsible' for Elevated Stock Prices and Record-High Options Activity, Says Deutsche Bank," *Business Insider*, January 26, 2021.
[7] "Koss Shoots 131% Higher as Tweet Pegs the Small-Cap Headphones Maker as a Possible Next WallStreetBets Darling," *Business Insider*, January 26, 2021.
[8] "Blackberry, AMC and Other Reddit YOLO Favorites That Aren't GameStop," *Dow Jones Institutional News*, January 26, 2021.
[9] "Elon Musk Enters GameStop Fray With a One-Word Tweet -- Barron's.com," *Dow Jones Institutional News*, January 26, 2021.

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Dow Jones Institutional News (January 26, 2021)

Professional investors are worried: How can financial markets function when stock movements are so obviously disconnected from fundamentals, played by both sides like a videogame?[10]

Dow Jones Institutional News (January 26, 2021)

Tuesday morning, RBC Capital analyst Paul Treiber cut his rating on BlackBerry shares to Underperform from Sector Perform, while keeping his price target of $7.50. He said the rally has lifted the stock's valuation to multiyear highs, and above those of its peers, while the fundamental outlook for the security-software business hasn't significantly changed.[11]

MarketWatch (January 26, 2021)

The investor group whose concerted action has apparently created a short squeeze in the stock of videogame retailer GameStop Inc. is also targeting shares of AMC Entertainment Inc., BlackBerry Ltd and retailer Express Inc., all of which are seeing sharp moves without any apparent news to act as a driver.[12]

Barron's (January 27, 2021)

Several factors have cast new light on BlackBerry (ticker: BB) shares in recent weeks, although none quite explain the dramatic surge in interest in the stock. Some observers link the rally to a short squeeze driven by heightened attention from retailer investors.[13]

Dow Jones Institutional News (January 27, 2021)

Nokia stock (ticker: NOK) shares has rallied more than 70% this week -- including gain of more than 50% on Wednesday -- without any fundamental basis.[14]

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[10] "The Day-Trading Barbarians at the Gate Won't Sack Wall Street -- Heard on the Street -- Update," *Dow Jones Institutional News*, January 26, 2021.
[11] "BlackBerry Stock Extends Rally Despite Downgrade -- Barron's.com," *Dow Jones Institutional News*, January 26, 2021.
[12] "Here Are Some of the Other Stocks Seeing GameStop-like Short Squeezes," *MarketWatch*, January 26, 2021.
[13] "BlackBerry Stock Extends Rally Despite Downgrade," *Barron's Online*, January 27, 2021.
[14] "Nokia Stock Is Surging. The Company Says It Can't Explain It -- Barron's.com," *Dow Jones Institutional News*, January 27, 2021.

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Dow Jones Institutional News (January 27, 2021)

GameStop isn't the only retailer caught up in this bearish bloodbath: Plenty of other highly shorted retail stocks have soared far above what recent fundamentals would support, if not to the same extent. … Bed Bath & Beyond (BBBY), with two-third of its float claimed by bears, has jumped 109% in 2021 and nearly 49% since last week.[15]

Dow Jones Institutional News (January 27, 2021)

[The Baird analyst] writes that he is still bullish about the company's new management and its ability to execute a successful transformation of the company. Yet with short bets backfiring -- sending the shares to dizzying heights -- "non-fundamental market dynamics are controlling the tape," and Bed Bath is already reflecting a lot of the good news he thinks it can deliver.[16]

Forbes (January 27, 2021)

… [S]hares of massively shorted stocks with big retail interest still saw eye-popping gains, with GameStop up 135%, after climbing 93% Tuesday, and embattled movie theater chain AMC Entertainment up a staggering 302%. … "Wednesday's price action can't be blamed on fundamentals, but instead comes down to crowded positioning, expensive valuations, the [uncertain] stimulus narrative and market nonsense," says Crisafulli [founder of Vital Knowledge Media and former JP Morgan market commentary contributor]. "The extreme short squeezes, the ongoing dump of fresh supply each and every day and the examples of froth are all slowly eroding confidence."[17]

MarketWatch (January 27, 2021)

Shares of AMC Entertainment Holdings Inc. AMC, BlackBerry Ltd. BB, headphone maker Koss Corp. KOSS and retailer Express Inc. EXPR have all experienced sharp

[15] "How to Bet on Retail Stocks When the Sector Has Gone Mad -- Barrons.com," *Dow Jones Institutional News*, January 27, 2021.
[16] "Bed, Bath & Beyond Stock Is Rocketing, but Bulls Are Bailing -- Barrons.com," *Dow Jones Institutional News*, January 27, 2021.
[17] "Dow Plunges 650 Points, Posting Worst Loss In 3 Months As Reddit Traders Fuel 'Market Nonsense,'" *Forbes.com*, January 27, 2021.

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moves without any apparent news to act as a driver, while facing a large amount of bets against them.[18]

New York Times (January 27, 2021)

Analysts say GameStop shares have become unmoored from underlying expectations for profit that typically determine the value of a stock.[19]

Reuters News (January 27, 2021)

Finnish technology firm Nokia said on Wednesday it was not aware of any reason for the continuing surge in its share price.[20]

Dow Jones Institutional News (January 28, 2021)

"There is some over-excitement in the market," said Olaf van den Heuvel, chief investment officer for Aegon Asset Management in the Netherlands, pointing to the surge in GameStop shares as one example. "It was bubble territory."[21]

Investor's Business Daily (January 28, 2021)

"The market is acting crazy," Harris [O'Neil Capital Management portfolio manager] said of the AMC stock and GME stock frenzy. "I never thought I'd see a repeat of the performance of the internet bubble. But I did, and what's happening in the market now feels a lot like those times where entire groups are moving up irrespective of fundamentals." … "These are the crazy things that can happen," Harris said of the retail frenzy behind GME stock and AMC stock. "The market has a way of rooting out inefficiencies."[22]

MarketWatch (January 28, 2021)

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[18] "U.S. Stocks Book Worst Daily Losses Since October as Powell Stresses Long Road to Recovery and Short Squeeze Drama Plays Out," *MarketWatch*, January 27, 2021.
[19] "'Dumb Money' Is on GameStop, and It's Beating Wall Street at Its Own Game," *NYTimes.com Feed*, January 27, 2021.
[20] "Nokia Not Aware of Any Reason for Share Surge," *Reuters News*, January 27, 2021.
[21] "Stock Futures Point to Steady Open; GameStop in Focus," *Dow Jones Institutional News*, January 28, 2021.
[22] "Short Squeeze Volatility With GME, AMC: O'Neil Portfolio Manager On Navigating Risk In 'Crazy' Market," *Investor's Business Daily*, January 28, 2021.

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Other stocks that have seen massive gains out of proportion to company financial performance in recent months include BlackBerry Ltd. BB, AMC Entertainment Holdings Inc. AMC, Bed Bath & Beyond Inc. BBBY, Express Inc. EXPR, Koss Corp. KOSS, Naked Brand Group Ltd. NAKD, American Airlines Group, Inc. AAL, Castor Maritime, Inc. CTRM, Sundial Growers Inc. SNDL, Tootsie Roll Industries Inc. TR and American Depository Receipts for Nokia Corp. NOK and Trivago N.V. TRVG.[23]

MarketWatch (January 28, 2021)

"Nokia is not aware of any material, undisclosed corporate developments or material change in its business or affairs that has not been publicly disclosed that would account for the recent increase in the market price or trading volume of its shares," the company said in a statement.[24]

CE NoticiasFinancieras (January 28, 2021)

… GameStop's actions are no longer rooted in business reality after Reddit fans pushed them to stratospheric levels, part of a well-documented phenomenon that has spread to AMC Entertainment Holdings and Tootsie Roll Industries.[25]

USA Today (January 28, 2021)

The trading frenzy this week over high-flying stocks like GameStop, AMC and Tootsie Roll has sparked concerns that the stock market is headed for a bubble resembling the dot-com boom and bust in 2000.[26]

Wall Street Journal (January 29, 2021)

From AMC to Bed Bath & Beyond to Blackberry, several stocks are seeing their stock prices surge, in contrast to what their company performance would suggest.[27]

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[23] "Lawmakers Demand Action on GameStop Saga, Robinhood Ban," *MarketWatch*, January 28, 2021.
[24] "Nokia's Stock Soars to a Record Gain on Record Volume, for No Apparent Reason," *MarketWatch*, January 28, 2021.
[25] "Is GameStop Really Worth $23 Billion After the Overwhelming Rise in Its Shares?" *CE NoticiasFinancieras*, January 28, 2021.
[26] "A Fight Is Raging in the Stock Market: Should You Worry About Your 401(k)?" *USA Today Online*, January 28, 2021.
[27] "GameStop Stock, Reddit and Robinhood: What You Need to Know; How Traders Online Drove the Videogame Retailer's Stock to New Highs and Caused a Crazy Week in Markets," *Wall Street Journal Online*, January 29, 2021.

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Wall Street Journal (January 29, 2021)

In all the madness, it has become easy to forget that GameStop is an actual business. That business closes its fiscal year on Saturday—wrapping up what is expected to be its second straight year of double-digit revenue declines. That business has also become completely decoupled from a stock that has shot up as much as 25-fold in just the last three weeks. The shares have now taken on a life of their own, serving as a "meme stock" driving a class war between individual investors and the Wall Street establishment. At some point—someday—the company's fundamentals will matter again. Those fundamentals show a retail chain of more than 5,000 stores struggling to stay relevant in a business shifting to digital.[28]

MarketWatch (January 29, 2021)

Shares in GameStop briefly hit the $500 mark in premarket trading, a stunning rise from the start of 2021 when the stock was worth just $19. The videogame retailer isn't the only company seeing a boom like this. Other shorted companies including AMC Entertainment Holdings AMC, BlackBerry Ltd. BB and retailer Express Inc. EXPR have seen stark upticks in value without any real news to back them up.[29]

CNET News.com (January 31, 2021)

The share price for GameStop -- $325 when the market closed on Friday -- doesn't tell the whole story about the company. … [T]his GameStop roller-coaster ride throws all logic and basic investment principles out the window. … Lost in all the hoopla is that GameStop continues to falter when it comes to all the important metrics for a company, with declining sales and the closing of 462 stores last year.[30]

Forbes (January 31, 2021)

Jeremy Siegel Professor of Finance, The Wharton School, Co-founder WisdomTree Investments, author, Stocks For The Long Run, The Future For Investors [stated] "GameStop is no where near worth what it was trading at but it's a perfect example of the greater fools theory where it's possible to make money on something if it's overvalued so long as there's someone willing to

[28] "A Tale of Two GameStops; Videogame Retailer's Actual Business Has Become Fully Decoupled from High-Flying Stock, but Fundamentals Have a Way of Lasting," *Wall Street Journal Online*, January 29, 2021.
[29] "Reddit Co-Founder Alexis Ohanian Compares GameStop Squeeze to Occupy Wall Street: 'This Is the New Normal,'" *MarketWatch*, January 29, 2021.
[30] "Ignore the Reddit-Fueled Spike, GameStop Is Actually Still in Trouble," *CNET News.com*, January 31, 2021.

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pay a higher price…I hope that these [Reddit] investors can be turned into long term investors where the odds are actually for you and not against you."[31]

New York Times (February 1, 2021)

Analysts' average price target for [GameStop] is just over $13 per share; in premarket trading today, the stock is at $300. "There's no reason that stock should be where it is," Bruce Cohen, co-founder of the retail advisory firm CH Consulting, told DealBook. "That is just a stock manipulation exercise."[32]

Associated Press Newswires (February 2, 2021)

The most glaring example of excess sweeping Wall Street now is GameStop's stock, which soared 1,625% in January. Shares of the struggling video game retailer have since fallen, but they remain way beyond a price Wall Street analysts say is rational based on its profit prospects. Other money-losing companies have surged as well, showing how easily some investors are pushing up prices for an investment, despite its risks. And with smaller investors driving much of the action, experts are making comparisons to the shoeshine worker giving stock tips in 1929.[33]

Barron's (February 2, 2021)

One issue is that the recent short squeeze—which have sent other stocks, including AMC, Bed Bath & Beyond, Macy's, and Stitch Fix, flying—doesn't reflect any underlying change in fundamentals that would point to a sustainably better future for the companies at the heart of the frenzy.[34]

Reuters News (February 2, 2021)

Institutional investors are still digesting the retail trading frenzy that has boosted GameStop Corp and other so called meme stocks in recent sessions against their financial fundamentals.[35]

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[31] "Here's What Investment Gurus Including Michael Steinhardt And Jeremy Siegel Say About The Meme Stock Bubble," *Forbes.com*, January 31, 2021.
[32] "What Is GameStop Really Worth?" *NYTimes.com Feed*, February 1, 2021.
[33] "It's Not Just GameStop Worrying Wall Street About a Bubble," *Associated Press Newswires*, February 2, 2021.
[34] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.
[35] "GLOBAL MARKETS-Asian Markets Firmer as Retail Frenzy Unsettles Outlook," *Reuters News*, February 2, 2021.

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New York Times (February 3, 2021)

But it's not clear how much longer the Reddit traders can hold the line. Intense media and Wall Street interest pushed many traders into these stocks late last week, with GameStop going as high as $483 last Thursday. They began trading this year at just over $17 a share. The huge run-up in the stock price appears to have little to do with the future prospects of the mall-based retailer, which has been losing money consistently. … "I hope the markets are moving away from some of the issues it dealt with last week and focusing on more of the true fundamentals," Cronk [chief investment officer of Wells Fargo Wealth and Investment Management] said.[36]

Associated Press Newswires (February 3, 2021)

The extreme moves in GameStop have been driven by a frenzy of speculative trading and appear to have little to do with the actual prospects of the company, which has been losing money consistently.[37]

Associated Press Newswires (February 3, 2021)

GameStop has been swept up in a battle between big-moneyed hedge funds betting against it and small investors trying to prop it up. That has caused GameStop's share price to soar despite the shaky financials underneath. … Many investors fully understand the contradiction between GameStop's stock price and its business fundamentals.[38]

Reuters News (February 3, 2021)

"The fundamentals are well known and obviously the stock prices have detached from the fundamentals," said Stephen Massocca, senior vice president at Wedbush Securities. "I have told people just stay away, it is dynamite and who knows when, how or where it blows up."[39]

Dow Jones Institutional News (February 3, 2021)

[36] "Big Tech and Banks Buoy the Market," *New York Times*, February 3, 2021.
[37] "GameStop Shares Drop 60% as Frenzied Rally Loses Steam," *Associated Press Newswires*, February 3, 2021.
[38] "GameStop's Stupefying Stock Rise Doesn't Hide Its Reality," *Associated Press Newswires*, February 3, 2021.
[39] "WRAPUP 8-'Reddit Rally' Stocks Bounce on Day After Selloff, Then Dip After Hours," *Reuters News*, February 3, 2021.

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Even the biggest GameStop (ticker: GME) bulls on Reddit would be hard-pressed to justify the company's current market valuation as the company faces a number of structural headwinds.[40]

Dow Jones Institutional News (February 4, 2021)

Individual investors became wonderfully engaged with stock picking as 2021 began. Unfortunately, many were buying stocks that had been flagged on social media as ripe for a short squeeze. There's nothing necessarily wrong with pushing up a stock to panic shortsellers into joining the buying frenzy -- but by the end of January, many of the companies targeted by squeeze campaigns had soared to valuations far out of line with analysts' forecasts for their businesses. Traders who were still buying seemed oblivious to fundamental analysis. And in the end, sales and earnings matter. At its January 28 peak of $483, GameStop (ticker: GME) stock was valuing the company above $33 billion, even though analysts predict losses for the next few years as it shutters hundreds of its videogame retailing locations.[41]

Investor's Business Daily (February 4, 2021)

… [T]he vast number of investors holding onto GameStop shares bought at 100, 200, 300, 400 or above, which offers a massive amount of overhead supply ready to sell into any rally. Even "diamond hands" can crack when faced with eye-watering losses. Meanwhile, it's unclear what the bull case for GME stock is on a fundamental basis. Shares could easily tumble from current levels.[42]

[40] "How Reddit Traders Saved Express Stock From Delisting -- Barrons.com," *Dow Jones Institutional News*, February 3, 2021.
[41] "Does Valuation Matter in a Short Squeeze? -- Barrons.com," *Dow Jones Institutional News*, February 4, 2021.
[42] "Dow Jones Futures: Hot Stock Market Rally Flashes Warning As GameStop Freefall Continues; Pinterest, Peloton, Snap Lead Big Earnings Movers," *Investor's Business Daily*, February 4, 2021.

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Wedbush (January 25, 2021)

Although we are cautious nearer-term on shares of Express, given the recent squeeze play coupled with an investor stampede rocketing shares higher, we maintain our NEUTRAL-rating on Express shares.[1]

Loop Capital Markets (January 25, 2021)

… [We] are raising our [BBBY's] price target to $30 from $18 primarily to reflect burgeoning retail investor interest in heavily shorted stocks. While we question the long-term sustainability of this trend, we are reminded of the famous quote: "The markets can remain irrational longer than you can remain solvent."[2]

Credit Suisse (January 26, 2021)

Retail investors driving shares: … this retail interest may continue to drive heightened volatility in AMC's shares near term.[3]

Scotiabank (January 27, 2021)

Market Moves Fuel Shares. The recent surge in the value of BlackBerry's shares appears to be driven by retail investors focused on a handful of stocks using a combination of purchasing near-dated call options and the underlying security.[4]

Telsey Advisory Group (January 28, 2021)

The sudden, sharp surge in Bed Bath & Beyond's share price and valuation likely has been fueled by a short squeeze, given the high short interest (over 60%), and speculation by retail investors, fueled in chat rooms, much like GameStop.[5]

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[1] "Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush*, January 25, 2021.
[2] "Raising Price Target As 'The Markets Can Remain Irrational Longer Than You Can Remain Solvent,'" *Loop Capital Markets*, January 25, 2021.
[3] "AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021.
[4] "Lowering Recommendation on Significant Market Move," *Scotiabank*, January 27, 2021.
[5] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.

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DNB Markets (January 28, 2021)

The Nokia ADRs have rallied at high volumes based on the Reddit retail frenzy. Nokia has commented that there is no underlying news. We see this as the result of bubble-like behaviour. …[6]

Credit Suisse (February 1, 2021)

… [D]ay traders have been reportedly aggressively buying the securities of several out-of-favor and heavily shorted US companies including AAL, AMC, BB, BBY, CTRM, EXPR, GME, KOSS, NAKD, NOK, SNDL, TR and TRVG. This caused the underlying stock prices to increase rapidly which then in turn encouraged more buying from both retail investors and short covering from institutional investors. … One trigger for the buying activity was retail investing websites including Reddit's WallStreetBets, which allows retail investors to communicate on investing topics.[7]

MKM Partners (February 1, 2021)

In our view, the recent volatility and spike in the company's stock, thanks to the Reddit/WallStreetBets crowd, has decoupled AMC's share price and its valuation.[8]

Avise Analytics (February 1, 2021)

GameStop Corp (NYSE: GME) … has witnessed an almost miraculous resurgence, aided by the users of a Reddit forum named "r/WallStreetBets." Collective buying from over 2 million of the group's members has pushed the stock price which stood at $18 a few weeks ago to an unbelievable high of $347.51.[9]

Societe Generale (February 3, 2021)

Nokia was one of the stocks affected by the recent wave of Reddit trade ideas (recommending buying heavily shorted names), alongside GameStop, AMC Entertainment and Blackberry. This explains the significant Nokia share price volatility

[6] "Northern Lights," *DNB Markets*, January 28, 2021.
[7] "US Online Brokers: Heightened Activity in Certain Stocks (AMC, GME) and the Impact on Brokers (SCHW, IBKR)," *Credit Suisse*, February 1, 2021.
[8] "Dowgrading to Sell: There's A Steep Price To Pay For Solvency," *MKM Partners*, February 1, 2021.
[9] "Gaming Out the Rise of GameStop," *Avise Analytics*, February 1, 2021.

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since 26/01. However, after the correction of recent sessions, we think most of the excess buying pressure on Nokia shares has now been absorbed.[10]

BofA Securities (February 4, 2021)

Over the past two weeks, there has been an unprecedented increase in the amount of retail interest in GME through online forums such as Reddit, and trading through platforms like Robinhood. This appears to be highly correlated with GME's share performance and we note that the days with the highest GME conversations and trading activity corresponded to large GME share price increases.[11]

Fundamental Research Corp. (February 8, 2021)

We started tracking Reddit considering the impact retail investors had on the overall market in the past few weeks, as seen from the large price movements of GME, AMC, and silver. … We noticed that the top two (GME and AMC) are experiencing a decline in the number of discussions. …[12]

BofA Securities (February 11, 2021)

Over the past several weeks, BBBY's shares experienced a significant increase on the back of a short squeeze and high retail enthusiasm. … Non-fundamental factors including short interest, daily volumes and Twitter/Reddit conversations that we believe drove the share spike have all fallen significantly. … While all else equal, lower short interest, trading volumes on mentions on online forums may mean less chance for a big share price spike, it should also lower potential volatility.[13]

Argus (February 12, 2021)

[10] "Looking Beyond a Seasonally Strong 4Q20, What Are the Risks to 2021 Expectations?" *Societe Generale*, February 3, 2021.
[11] "When Fundamentals Still Appear on the Sidelines, What Other Factors Matter," *BofA Securities*, February 4, 2021.
[12] "Analysts' Ideas of the Week: Introducing Reddit Sentiment Tracker," *Fundamental Research Corp.*, February 8, 2021.
[13] "Remain Positive on Turnaround and Upgrade to Buy on Share Pull Back," *BofA Securities*, February 11, 2021.

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NOK ADRs were briefly caught in the day-trader frenzy on the WallStreetBets sub-Reddit, which propelled the ADRs nearly to $7 in January. Reflecting diminished prospects, NOK has slipped back to the $4 area.[14]

Canaccord Genuity (February 16, 2021)

Share price up ~100% in C2021: BlackBerry shares have appreciated ~100% as part of a Reddit driven rally.[15]

BofA Securities (March 24, 2021)

Over the past two months and in collaboration with BofA's predicative analytics team, we have analyzed the impact on GME shares from non-fundamental factors including the number of conversations on Reddit relating to GME and stimulus, trading vols and short interest. All these factors have shown a tight relationship and large increases have corresponded to several big surges in GME's share price. Recently these factors have all declined significantly from record levels as have GME share price.[16]

[14] "Analyst's Notes," *Argus*, February 12, 2021.
[15] "Anticipate Gradual Software & Services Recovery and Increasing PT to $10, but Downgrade to SELL on Valuation," *Canaccord Genuity*, February 16, 2021.
[16] "4Q Op. Earnings Disappoint in a Big Way So What's the GME Plan from Here? Reit U/P," *BofA Securities*, March 24, 2021.

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Dow Jones Institutional News (January 22, 2021)

GameStop shares surge, setting an all-time intraday record after getting a boost from the ongoing battle between day traders and short-sellers. … A quarrel over GameStop between short-seller Citron Research and day traders on Twitter points to a possible effort by individual investors to squeeze short-sellers.[1]

Barron's (January 25, 2021)

[Quoting a Telsey Advisory Group analyst, a Barron's article noted that GameStop] has recently been the most-discussed name on the social media site Reddit. … "[S]imilar excitement from that crowd appears to be moving Stitch Fix (SFIX) and Bed Bath & Beyond (BBBY) stock. Both swung wildly on Monday. Other stocks mentioned prominently on the WallStreetBets forum on Reddit include AMC Entertainment Holdings (AMC), Blackberry (BB), Express (EXPR), and Nokia (NOK). They all posted double-digit gains on Monday.[2]

Benzinga.com (January 25, 2021)

Express, Inc. (NYSE: EXPR) shares surged 88.3% to $3.3710. Express shares jumped 53% on Friday after trader Will Meade on Twitter compared the stock to GameStop and set a $10 price target.[3]

Business Insider (January 25, 2021)

What began as an update to the retailer's board has exploded into the latest example of an internet-fueled momentum trade. Day traders looking to extend the company's rally have populated online forums with calls to buy more shares and avoid selling.[4]

Dow Jones Institutional News (January 25, 2021)

[1] "GameStop Surges as Day Traders Squabble With Short Sellers -- Market Talk," *Dow Jones Institutional News*, January 22, 2021.
[2] "GameStop Stock Surges, Plunges, and Ends at Record Close," *Barron's Online*, January 25, 2021.
[3] "61 Stocks Moving In Monday's Mid-Day Session," *Benzinga.com*, January 25, 2021.
[4] "GameStop Skyrockets 145% as Reddit-Fueled Rally Enters 3rd Week," *Business Insider*, January 25, 2021.

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The rally has been fueled by individual investors, encouraging each other on social media to pile into GameStop shares and options.[5]

Dow Jones Institutional News (January 25, 2021)

The tussle over the company, with a modest market value of about $5 billion at Friday's close and four years of declining sales, exemplifies the increased sway of retail investors. Many poured into the market during the coronavirus lockdown, congregating on online platforms to swap trading ideas and to boast about winning bets.[6]

Financial Times (January 25, 2021)

… [A] hoard of retail traders who seem to often congregate on Reddit forum r/wallstreetbets managed to cause the stock of video gaming retailer GameStop to rocket 50 per cent in a day up to $65.01, giving it a market value of $4.5bn.[7]

Financial Times (January 25, 2021)

Intense enthusiasm among online message boards jolts a clutch of stocks[.] Shares in GameStop and BlackBerry rocketed in New York on Monday as amateur online traders continued their assault on professional investors betting that the stocks were overvalued.[8]

CE NoticiasFinancieras (January 25, 2021)

Apparel retailer Express Inc. skyrocketed in premarket trading Monday, extending its meteoric rally with record volume as retail investors touted the company across various social media platforms including Reddit message boards. Shares of Columbus, Ohio-based Express rallied about 140% in early trading after gaining for a third week. The stock had advanced 98% this year through Friday. Nearly 60 million shares have traded so far today -- more than six times the amount that change hands in an average day for Walmart Inc. -- after trading a record 77 million on Friday. Express has been the subject of Reddit boards where users speculated whether it could be the next GameStop, the video-games retailer that is surging again today.[9]

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[5] "GameStop Stock Surges to Fresh Record," *Dow Jones Institutional News*, January 25, 2021.
[6] "GameStop Stock Surges to New Record -- Update," *Dow Jones Institutional News*, January 25, 2021.
[7] "GameStop Can't Stop Going Up," *Financial Times*, January 25, 2021.
[8] "GameStop and BlackBerry Shares Soar on Amateur Traders' Fervour," *Financial Times*, January 25, 2021.
[9] "Retailer Express More Than Doubles Amid Reddit Speculation," *CE NoticiasFinancieras*, January 25, 2021.

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CE NoticiasFinancieras (January 25, 2021)

These days you also need to be fluent in emoji: If a post on a Reddit Wall Street message board contains icons of rocket ships pointing upward, you best pay attention. Some of Reddit's favorite rockets are soaring again on Monday in premarket trading. Video-game retailer GameStop Corp., already sitting on a tidy 245% year-to-date gain, is up another 50%. Express Inc., who some on Reddit have speculated will be the next GameStop, is up more than 100%. BlackBerry Ltd. is tacking on another 40% after more than doubling in 2021.[10]

CE NoticiasFinancieras (January 25, 2021)

Still, even with Citron standing down, the mania has only gained momentum -- and spread to other stocks. GameStop soared as much as 145% on Monday, before briefly dipping to a loss and then gaining 14% by 12:45 p.m. Express Inc., who some on Reddit have speculated will be the next GameStop, rocketed by as much as 123%. Meanwhile, BlackBerry Ltd. climbed as much as 48% after more than doubling in 2021.[11]

Dow Jones Institutional News (January 25, 2021)

The buying pressure [from retail investors] has led money managers to switch out of substantial bets that the stock would fall, analysts said. This resulted in a short squeeze. …[12]

Business Insider (January 26, 2021)

From AMC to Bed Bath & Beyond, the market's most-shorted stocks are rallying as Reddit day-traders pile in. More on the impact that very enthusiastic amateurs are having on the market.[13]

Business Insider (January 26, 2021)

Retail traders continued to bid up GameStop, BlackBerry, and other favorites through volatile, Reddit-fueled momentum trades. … Retail investors pushed Reddit-favorites including GameStop, AMC Entertainment, and BlackBerry even higher following

[10] "Reddit's Rocket-Ship Stock Picks Like GameStop Blast Off Again," *CE NoticiasFinancieras*, January 25, 2021.
[11] "GameStop Short-Sellers Reload Bearish Bets After $6 Billion Loss," *CE NoticiasFinancieras*, January 25, 2021.
[12] "GameStop Shares Surge to New Record -- 3rd Update," *Dow Jones Institutional News*, January 25, 2021.
[13] "10 Things You Need to Know Before the Opening Bell," *Business Insider*, January 26, 2021.

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Monday's rallies. Posts on online forums such as WallStreetBets boasting outsized gains have fueled momentum for such stocks in recent sessions. Online traders continue to urge each other to buy more shares, aiming to further squeeze short-sellers and send stocks to record highs.[14]

Business Insider (January 26, 2021)

Retail investors, including members of the Reddit forum r/wallstreetbets, have made concerted efforts to drive GameStop shares higher and squeeze short-sellers such as Melvin Capital. They helped to send GameStop's stock price up as much as 145% on Monday, then as much as 69% on Tuesday.[15]

Daily Herald (January 26, 2021)

Trading in the stock market used to require a mastery of all sorts of Wall Street jargon. These days you also need to be fluent in emoji: If a post on a Reddit Wall Street message board contains icons of rocket ships pointing upward, you best pay attention. Some of Reddit's favorite rockets are soaring again on Monday even though benchmark equity gauges are weaker. From mall-based retailers like GameStop Corp. and Express Inc. to telecom blasts from the past such as BlackBerry Ltd. and Nokia Oyj, the r/wallstreetbets forum is minting small fortunes for retail traders who get in and out of the favored names at the right time.[16]

Dow Jones Institutional News (January 26, 2021)

Attention from individual investors has provided support for shares tied to the market's most volatile names, a group that includes AMC and videogame retailer GameStop Corp. Individual investors are encouraging each other on online forums to purchase shares and options tied to these companies, in part to squeeze bets from other investors that shares would fall.[17]

Dow Jones Institutional News (January 26, 2021)

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[14] "S&P 500 Hits Record High as Investors Prepare for Blue-Chip Earnings Reports," *Business Insider*, January 26, 2021.
[15] "'Big Short' Investor Michael Burry Blasts Reddit-Fueled GameStop Rally as 'Unnatural, Insane, and Dangerous,'" *Business Insider*, January 26, 2021.
[16] "Reddit's Rocket-Ship Stock Picks Like BlackBerry Soar Again," *Daily Herald*, January 26, 2021.
[17] "AMC Chain Avoids Bankruptcy -- WSJ," *Dow Jones Institutional News*, January 26, 2021.

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In premarket trading, shares of GameStop rose 24% as individual traders, propelled by social media, piled into the stock. The stock swung wildly Monday and has gained more than 300% this year, in the latest sign that frenetic trading by retail traders is leading to outsize stock-market swings.[18]

MarketWatch (January 26, 2021)

The investor group whose concerted action has apparently created a short squeeze in the stock of videogame retailer GameStop Inc. is also targeting shares of AMC Entertainment Inc., BlackBerry Ltd and retailer Express Inc., all of which are seeing sharp moves without any apparent news to act as a driver.[19]

MarketWatch (January 26, 2021)

In addition to the "wider squeeze play" of the more shorted stocks, Wedbush's Redding said the stock benefited from an "investor stampede" following bullish comments from a Twitter "personality" Will Meade. Meade's Twitter profile says he's a former portfolio manager at a Goldman Sachs founded $1 billion hedge fund, with over 127,000 followers (he's not verified). On Jan. 22, just before Express's two-day rocket ride, Meade tweeted that Express's stock fit the criteria of being the next GameStop, as it had a low stock price, had a retail brand name that could turn around and had high short interest levels, at about 13% of the public float. Redding reiterated her neutral rating on Express, and her $1.50 stock price target. "We are more cautious on share price and valuation now as the stampede on Express shares seems to discount the company hemorrhaging cash," Redding wrote in a note to clients. [20]

Postmedia Breaking News (January 26, 2021)

… [H]oards of day traders have piled into hot stocks like GameStop Corp. and Express Inc., causing both to soar since the beginning of the year.[21]

Reuters News (January 26, 2021)

[18] "North American Morning Briefing: Stock Futures Waver After Hitting Fresh Records," *Dow Jones Institutional News*, January 26, 2021.
[19] "Here Are Some of the Other Stocks Seeing GameStop-like Short Squeezes," *MarketWatch*, January 26, 2021.
[20] "Here Are Some of the Other Stocks Seeing GameStop-like Short Squeezes," *MarketWatch*, January 26, 2021.
[21] "Etsy Stock Jumps on Elon Musk's Praise After He Buys Marvin the Martian Hat for His Dog," *Postmedia Breaking News*, January 26, 2021.

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Elevated retail participation has contributed to soaring prices. "For retail traders, the warning signals on this … (are) if you are trading it, you are taking so much of an extra risk compared to normal activity. This is not normal activity," said JJ Kinahan, chief market strategist at TD Ameritrade.[22]

Al Jazeera (January 27, 2021)

Euphoria born in day-trader chat rooms has turned GameStop into the biggest story stock of the retail era, its improbable surge an emblem of the newfound power of individual investors. At the same time, it's become a major headache for institutional investors betting it would fall. An epic short squeeze lifting the shares has set off a search for other companies that might be similarly vulnerable, with Express Inc., Bed Bath & Beyond Inc. and AMC Entertainment Holdings Inc. among stocks surging in premarket trading on Wednesday.[23]

Business Insider (January 27, 2021)

Frenzied buying also drove GameStop shares up as much as 160%, BlackBerry up 31%, and Bed Bath & Beyond up 46%. The four companies gained a combined $29 billion in market capitalization at their peak stock prices. Amateur investors have gathered, most notably on the Reddit forum r/wallstreetbets, to pinpoint stocks they can buy en masse with the hope of scoring fast profits. They frequently target stocks that are popular shorts, as driving their stock prices up can pressure short-sellers into buying shares back to cover their positions, which sends prices even higher.[24]

Business Insider (January 27, 2021)

The Redditors of r/WallStreetBets have also begun reviving the stock prices of other frequently-shorted stocks including AMC, Bed Bath & Beyond, Blackberry, Koss headphones, and Nokia.[25]

Business Insider (January 27, 2021)

Nokia shares jumped as much as 86% on Wednesday before paring gains as Reddit's day-traded army boosted the name. The Finnish telecommunications company has

[22] "Update 2–'This Is Not Normal' – Wall Street Grows Wary of Stock Bubbles," *Reuters News*, January 26, 2021.
[23] "GameStop Shares Keep Surging as Day Traders Keep Upper Hand," *Al Jazeera*, January 27, 2021.
[24] "AMC Spikes 420% as Day Traders Ignite Shorted Stocks Like GameStop, BlackBerry, and Bed Bath & Beyond," *Business Insider*, January 27, 2021.
[25] "Elizabeth Warren and AOC Slam Wall Streeters Criticizing the GameStop Rally for Treating the Stock Market Like a 'Casino,'" *Business Insider*, January 27, 2021.

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become the latest legacy tech star on Reddit's WallStreetBets forum. "It is as if someone found a newspaper from 2006 to identify who were the golden tech companies from back then. … Then add in the perceived attraction of a low absolute dollar stock price in the single digits, and a brand people remember and bought blindly hoping they had discovered the next Tesla." …[26]

Barron's (January 27, 2021)

Several factors have cast new light on BlackBerry (ticker: BB) shares in recent weeks, although none quite explain the dramatic surge in interest in the stock. Some observers link the rally to a short squeeze driven by heightened attention from retailer investors.[27]

Benzinga.com (January 27, 2021)

Shares of Express, Inc. (NYSE: EXPR) got a boost, shooting 288% to $11.80 amid continued momentum driven by retail investor interest in the stock.[28]

Dow Jones Newswires Chinese (January 27, 2021)

Fanatics on sites like Reddit's WallStreetBets have clashing with hedge fund investors and have been casting the clashes been prominent Wall Street short sellers and individual investors in GameStop as a battle between deep-pocketed traditional investors and average folk. However, the recent run-up in GameStop is spilling over into other areas of the market, with shares of companies like AMC Entertainment also surging in price on Wednesday, along with shares of Bed Bath & Beyond (BBBY) and retailer Express Inc. (EXPR). whose shares were up 220%.[29]

Dow Jones Institutional News (January 27, 2021)

But taking a fundamental view seems a tad foolish right now. Consider KeyBanc Capital Markets analyst Bradley Thomas, who hypothesizes that Bed Bath & Beyond's meteoric rise is being driven by "the attention received from the Reddit message board WallStreetBets, which has been targeting small-cap stocks with high short interest," in what calls to mind a 21st century

[26] "Nokia Shares Jump as Legacy Tech Brands Become Reddit Traders' New Playgrounds (NOK)," *Business Insider*, January 27, 2021.
[27] "BlackBerry Stock Extends Rally Despite Downgrade," *Barron's Online*, January 27, 2021.
[28] "Mid-Day Market Update: Crude Oil Rises 1%; Globus Maritime Shares Plummet," *Benzinga.com*, January 27, 2021.
[29] "GameStop, AMC Trading Is Now Being Restricted at TD Ameritrade," *Dow Jones Newswires Chinese*, January 27, 2021.

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equivalent of potentially apocryphal shoeshine boys giving Joe Kennedy stock tips. Except this time, it's the shoeshine boy who is laughing all the way to the bank as Bed Bath & Beyond Stock has more than doubled in 2021 after rising another 18% on Tuesday.[30]

Dow Jones Institutional News (January 27, 2021)

Shares of the communications infrastructure supplier Nokia have continued to soar -- one of a growing group of stocks seeing outsize moves on the back of surging retail trading.[31]

Dow Jones Institutional News (January 27, 2021)

The past year has seen a boom in individuals buying stocks through retail online platforms such as Robinhood. More and more, they seem to be coordinating their moves on sites such as Reddit's WallStreetBets, placing wagers on firms that are under attack by professional speculators like hedge funds.[32]

Financial Times (January 27, 2021)

Some analysts and investors say many retail investors have learnt that by banding together to blitz-purchase calls, they can help drive the price of the underlying stock up to the strike prices by compelling dealers to hedge their own exposure.[33]

Forbes (January 27, 2021)

Shares of embattled movie theater operator AMC Entertainment are on a volatile tear Wednesday, at one point surging more than 300% as frenzied buying continues from retail traders actively trying to squeeze out Wall Street shops from some of the most heavily shorted stocks on the market. … As of 11:00 a.m. shares of AMC Entertainment, one of last year's worst-performing stocks, has surged more than 200% Wednesday, hitting more than $15 per share–nearly seven times the average analyst price target. Along with GameStop–which is heading up much of the wild short squeeze–AMC Entertainment is one of the market's most heavily shorted stocks, counting some $730

[30] "How to Bet on Retail Stocks When the Sector Has Gone Mad -- Barrons.com," *Dow Jones Institutional News*, January 27, 2021.
[31] "Nokia Stock Is Surging. The Company Says It Can't Explain It. -- Barrons.com," *Dow Jones Institutional News*, January 27, 2021.
[32] "The Reddit GameStop Bubble Is Just a Game -- for Now -- Heard on the Street," *Dow Jones Institutional News*, January 27, 2021.
[33] "'Weaponised' Options Trading Turbocharges GameStop's Dizzying Rally," *Financial Times*, January 27, 2021.

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million in short interest as of Tuesday afternoon, according to data from S3 Partners. At-home traders on Reddit's r/WallStreetBets' Discord server spent much of Tuesday night creating memes to convince people to buy AMC stock, The Verge reported Wednesday, with hundreds at one point infiltrating a Twitch stream from rapper Soulja Boy in an attempt to get him to hype up AMC.[34]

Investing.com (January 27, 2021)

It's been the story of the week and promises to keep on giving. A huge battle between professional and retail traders continues to play out in the shares of GameStop Corp (NYSE:GME), AMC Entertainment Holdings Inc (NYSE:AMC), BlackBerry Ltd (NYSE:BB) Express Inc (NYSE:EXPR), and Koss Corporation (NASDAQ:KOSS) -- the five most popular stocks on Investing.com. All five have notched eye-popping gains in the last few days, and massive trading volume in their shares has caused disruptions on online platforms such as TD Ameritrade (NASDAQ:AMTD) and Schwab. Some brokers have put trading restrictions on the shares, and the exchanges have halted some of them for trading multiple times because of volatility.[35]

Investing.com (January 27, 2021)

GameStop Corp (NYSE:GME), AMC Entertainment Holdings Inc (NYSE:AMC), BlackBerry Ltd (NYSE:BB), Express Inc (NYSE:EXPR), ad[sic] Koss Corporation (NASDAQ:KOSS) are up double, or even triple, digits this year, skyrocketing higher in the last couple of days as retail traders battle professional short sellers in a drama that is the talk of Wall Street. It's all happening on a Reddit online forum called "WallStreetBets," where investors chat about investing ideas in casual, often rowdy way.[36]

CE NoticiasFinancieras (January 27, 2021)

[34] "Another Wild Reddit Rally As AMC Surges 300%, Online Brokers Crash, Shares Are Halted And Short-Sellers Cede Losses," *Forbes.com*, January 27, 2021.
[35] "Airline Profits, McDonalds, GameStop Shorts: 3 Things to Watch," *Investing.com*, January 27, 2021.
[36] "These Five Most Popular Stocks Have Something in Common: GameStop Mania," *Investing.com*, January 27, 2021.

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… GameStop's actions are no longer rooted in business reality after Reddit fans pushed them to stratospheric levels, part of a well-documented phenomenon that has spread to AMC Entertainment Holdings Inc. and Tootsie Roll Industries Inc.[37]

Reuters News (January 27, 2021)

GameStop, BlackBerry and Nokia were among the most heavily traded U.S. stocks before the bell, with analysts putting the moves partly down to herds of amateur investors chasing tips from Reddit discussion threads or the private Facebook group "Robin Hood's Stock Market Watchlist."[38]

Reuters News (January 27, 2021)

… AMC and Nokia Oyj … were again among the most heavily traded in pre-market deals, with Reddit discussion threads again humming with chatter about the stocks.[39]

Reuters News (January 27, 2021)

In the meantime, Reddit's Wallstreetbets stock trading discussion group were [sic] backing the [GME], buying shares and call options on the stock. A similar euphoria has boosted BlackBerry and Nokia.[40]

Reuters News (January 27, 2021)

As the buying frenzy in certain stocks extends into Wednesday, with shares of GameStop and AMC Entertainment Holdings surging for a fourth day, … "At some point in time valuation is going to matter and it won't matter what social media is cheering the stock on," said Matthew Keator, managing partner at The Keator Group in Lenox Massachusetts.[41]

Reuters News (January 27, 2021)

[37] "Reddit WallStreetBets: Who Are the Trolls Operating on the Wall Street Stock Exchange," *CE NoticiasFinancieras*, January 27, 2021.
[38] "GameStop Stock Doubles Again with No Let-up in Amateur Interest," *Reuters News*, January 27, 2021.
[39] "UPDATE 2–GameStop Stock Surge Hits Fourth Day, Hedge Funds Walk Away," *Reuters News*, January 27, 2021.
[40] "GameStop Up Another 60%, Amateur Interest Shows No Sign of Abating," *Reuters News*, January 27, 2021.
[41] "LIVE MARKETS–What Does the Trading Frenzy Mean for Broader Markets?" *Reuters News*, January 27, 2021.

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The stock [Nokia] is among top retail investors' favourites of the week, along with GameStop and AMC, driven up after frenzied discussion on Reddit threads.[42]

Reuters News (January 27, 2021)

"This retail-driven short squeeze is kind of taking these exaggerated moves to new levels that I have never seen before. It is sort of remarkable," said Eric Kuby, chief investment officer at North Star Investment Management in Chicago. But, he said, "this is something that is not going to continue much longer because it is completely decoupled from any kind of economic reality."[43]

New York Times (January 27, 2021)

That's what is happening with GameStop. As retail investors began to buy up its shares and options – many of them egged on by Wall Street Bets and other forums – its stock began to surge, forcing the short-selling hedge funds to buy back the borrowed shares at a higher price, which itself pushed the stock price higher. In Wall Street parlance, this is a "short squeeze." …[44]

Reuters News (January 27, 2021)

The use of volatile call options, herd buying through social network Reddit, the involvement of Tesla's Elon Musk and a burst of copycat trades in an apparent speculative retail bubble have contributed to put low profile GameStop on the front page of financial news.[45]

Reuters News (January 27, 2021)

The stampede of retail investors has disrupted the marketplace, taking seemingly rational investments and turning them upside down, said Jack Ablin, chief investment officer at Cresset Capital Management in Chicago.[46]

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[42] "UPDATE 1–Nokia Not Aware of Any Reason for Share Surge," *Reuters News*, January 27, 2021.
[43] "LIVE MARKETS–What Does the Trading Frenzy Mean for Broader Markets?" *Reuters News*, January 27, 2021
[44] "'Dumb Money' Is on GameStop, and It's Beating Wall Street at Its Own Game," *NYTimes.com Feed*, January 27, 2021.
[45] "Timeline: GameStop's 1,600% Surge in Retail Investor vs Hedge Fund Battle," *Reuters News*, January 27, 2021.
[46] "GLOBAL MARKETS–Stocks Fall, Dollar Up on Virus, Frothy Market Fears," *Reuters News*, January 27, 2021.

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Barron's (January 28, 2021)

The financial turmoil was caused by the organized buying of companies including videogame retailer GameStop, software company BlackBerry (BB) and movie-theater chain AMC Entertainment (AMC), all of which have had troubled financial performance that had led many institutional players to short their stocks.[47]

Business Insider (January 28, 2021)

Day traders, organizing their efforts on Reddit and alternative platform Discord, also drove up the prices of heavily-shorted stocks such as cinema chain AMC, hammering short-sellers.[48]

Business Insider (January 28, 2021)

Members of r/WallStreetBets, which has more than 2 million users, have been bidding up GameStop shares in the past weeks, causing the stock to skyrocket more than 1,200% since mid-January. … Redditors' reasons behind pushing up the stock price have varied, from those reminiscing about going to GameStop as adolescents, to those just wanting to make money, to those wanting to get revenge on Wall Street.[49]

Business Insider (January 28, 2021)

… Reddit's r/WallStreetBets … has been fueling massive volatility in the stock market over the past several days by driving up share prices for GameStop, AMC Theaters, and Nokia.[50]

Dow Jones Institutional News (January 28, 2021)

[47] "Stocks Close Higher, Bouncing Back From Big Losses," *Barron's Online*, January 28, 2021.
[48] "GameStop Plunges as Much as 60% After Robinhood Curbs Trading on Wildly Volatile Morning," *Business Insider*, January 28, 2021.
[49] "Some Redditors Say the GameStop Rally Is Revenge Against Wall Street for the 2008 Collapse (GME)," *Business Insider*, January 28, 2021.
[50] "Discord Bans r/WallStreetBets Server Over Hate Speech Amid the Group Driving GameStop Shares Through the Roof (GME)," *Business Insider*, January 28, 2021.

Exhibit 11
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Bed Bath & Beyond is another stock that's part of the Reddit rally. Up by 43.5% on Wednesday, it is also down 7.4% ahead of the open Thursday.[51]

Dow Jones Institutional News (January 28, 2021)

Trading in fast fashion clothing retailer Express's shares drop sharply and were briefly halted Thursday due to volatility following a massive gain Wednesday driven by the social media fueled buying frenzy that started with GameStop.[52]

Financial Times (January 28, 2021)

The dramatic moves highlight the growing influence of retail traders, who have organised on Reddit. Their success in pushing up stocks that are the subject of large short bets by hedge funds has led them to target a growing number of companies on both sides of the Atlantic.[53]

Financial Times (January 28, 2021)

As day-traders on Reddit have found success, they have moved en masse to a growing number of securities. Stocks such as US home goods retailer Bed Bath & Beyond, Finnish telecoms group Nokia, German pharmaceuticals company Evotec, former Financial Times owner Pearson and Polish games developer CD Projekt climbed sharply in intraday trading on Wednesday.[54]

Investor's Business Daily (January 28, 2021)

Chico's, Tootsie Roll Join The GameStop Flash Rally … Other stocks appeared to have made their way onto the flash-mob radar early Thursday. Candymaker Tootsie Roll Industries eased to an 8% gain, after an early spike. Tootsie Roll vaulted 55% in early trade Wednesday, then narrowed its advance to 11%.[55]

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[51] "Tesla, Lumen Technologies, AMC: What to Watch When the Stock Market Opens Today," *Dow Jones Institutional News*, January 28, 2021.
[52] "Express Shares Drop After Being Swept Up In Retail Frenzy -- Market Talk," *Dow Jones Institutional News*, January 28, 2021.
[53] "'Short Squeeze' Spreads as Day Traders Hunt Next GameStop," *Financial Times*, January 28, 2021.
[54] "'Short Squeeze' Spreads as Day Traders Hunt Next GameStop," *Financial Times*, January 28, 2021.
[55] "Dow Jones Today Leads Stocks Higher After Jobs, GDP Data; Apple, Tesla Earnings; New Stocks Join GameStop Flash Rally," *Investor's Business Daily*, January 28, 2021.

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Investor's Business Daily (January 28, 2021)

GameStop stock jumped 134% yesterday [January 27] as option volume continues to go through the roof. The "wallstreetbets" Reddit crowd have really ramped this stock through aggressive call option buying which is putting huge amounts of pressure on other market participants.[56]

Reuters News (January 28, 2021)

Shares of GameStop, AMC Entertainment, Koss Corp and BlackBerry all dropped at least 20% moments after the shuttering of the forum, highlighting the role it has played in fueling stock rallies that many say have been driven primarily by retail investors.[57]

Wall Street Journal (January 28, 2021)

Shares of a handful of firms such as GameStop Corp. and BlackBerry Ltd. posted triple-digit gains in recent weeks, part of a frenzy whipped up by individual investors.[58]

Wall Street Journal (January 28, 2021)

WallStreetBets has been the subject of growing fascination and scrutiny as once-unpopular stocks ranging from GameStop Corp. to AMC Entertainment Holdings Inc. have drawn significant interest from individual investors, helping catapult their share prices to eye-popping highs. Much of the discussion surrounding these shares has originated on WallStreetBets and then was amplified across the internet.[59]

Barron's (January 29, 2021)

So far this week, stocks of companies including GameStop (ticker: GME), AMC Entertainment (AMC), Nokia (NOK), Express (EXPR), and American Airlines (AAL)

[56] "GME Stock: Option Volume Goes Through The Roof," *Investor's Business Daily*, January 28, 2021.
[57] "GameStop, Other Retail Darlings Dented After Reddit Group Briefly Shuts Doors," *Reuters News*, January 28, 2021.
[58] "Banking & Finance: Online Investors Create Buzz For Stocks on Social Media," *Wall Street Journal*, January 28, 2021.
[59] "Banking & Finance: Reddit's WallStreetBets Forum Briefly Goes Dark," *Wall Street Journal*, January 28, 2021.

Exhibit 11
Selected Press Commentary on Retail Investor Coordination
January 21, 2021 – February 4, 2021

have been swinging wildly, driven in part by individual investors organizing on online message boards.[60]

Business Insider (January 29, 2021)

Forum members have banded together to drive up GameStop stock by more than 1,500% over the last month, with seemingly little business basis.[61]

Dow Jones Institutional News (January 29, 2021)

The saga unfolding surround GameStop, AMC, and other stocks has largely been driven by activity on social media. Investors on Reddit have driven the price of these companies' shares higher in recent weeks in an effort to squeeze hedge funds that had bet on these companies' struggles.[62]

Financial Times (January 29, 2021)

While GameStop got most of the attention on the Reddit forum r/WallStreetBets, the #saveAMC hashtag quickly caught fire too. After closing at $3.51 a share last Friday, AMC shares had rocketed to $19.90 at the end of business on Wednesday.[63]

Investor's Business Daily (January 29, 2021)

Meanwhile, short squeeze stocks like GameStop and AMC Entertainment continued higher. Shares of GameStop gained as much as 70% Friday [January 29] after closing down 44% the day prior while AMC was up 54%. Both stocks have been swinging wildly this week due to coordinated trading by retail investors using the WallStreetBets Reddit chat room.[64]

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[60] "Wall Street Suggests Ways for American Airlines and Others to Cash In on Squeeze. Investors Should Be Wary.," *Barron's Online*, January 29, 2021.
[61] "Short-Sellers Are Nursing Estimated Losses of $19 Billion in 2021 After Betting GameStop's Share Price Would Fall," *Business Insider*, January 29, 2021.
[62] "Read This Before You Try to Grab a Slice of GameStop's Epic Ride -- Barrons.com," *Dow Jones Institutional News*, January 29, 2021.
[63] "Revealed: SoftBank's Lucrative Executive Lending Scheme," *Financial Times*, January 29, 2021.
[64] "Dow Jones Down 575 Points; GameStop, AMC Soar; This Financial Stock Breaks Out," *Investor's Business Daily*, January 29, 2021.

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Selected Press Commentary on Retail Investor Coordination January 21, 2021 – February 4, 2021

Reuters News (January 29, 2021)

Earlier this week, GameStop surged 50% in extended trade after Musk tweeted "Gamestonk!!", along with a link to Reddit's Wallstreetbets stock trading discussion group.[65]

The New York Times (January 29, 2021)

GameStop started the week as a curiosity — an illustration of how markets may have become detached from reality and how small traders can use options to drive stock prices. By Tuesday, the story of the stock had become an obsession, as it nearly doubled in price. Groups of renegade investors on forums such as Reddit and Discord were trying to force a short squeeze — pushing up the price of stocks that hedge funds had bet would go down.[66]

Wall Street Journal (January 29, 2021)

GameStop has garnered hundreds of thousands of posts over the past month across Reddit, Twitter and Facebook, according to data this week from Meltwater, a global media intelligence company. As the stock has vaulted higher, its shares have traded in a frenzy, making it one of the most popular bets in the U.S. market in recent days, according to Dow Jones Market Data.[67]

Business Insider (January 30, 2021)

Members of Wall Street Bets — a retail-investing subreddit — have led the charge in driving GameStop shares up as much as 2,000% this month. They have also worked in concert to spike the stock prices of AMC, BlackBerry, Bed Bath & Beyond, and other heavily shorted stocks. Their goal is to score quick profits and squeeze short-sellers into covering their positions, sending the stocks even higher.[68]

Dow Jones Institutional News (January 30, 2021)

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[65] "LIVE MARKETS-S&P 500 Ends Bruising Week in the Red," *Reuters News*, January 29, 2021.
[66] "Here's Everything That Happened with GameStop This Week," *NYTimes.com Feed*, January 29, 2021.
[67] "Keith Gill Drove the GameStop Reddit Mania. He Talked to the Journal.," *The Wall Street Journal Online*, January 29, 2021.
[68] "Meet the GameStop Investor Upending the Stock Market with Cat Memes, Reaction GIFs, and Fundamental Analysis," *Business Insider*, January 30, 2021.

Exhibit 11
Selected Press Commentary on Retail Investor Coordination January 21, 2021 – February 4, 2021

The tumult surrounding the wild swings in stocks such as GameStop (ticker: GME) no doubt has been fueled by the desire for both gain and excitement for thousands of traders taking their cues from Reddit. And while it shares many aspects of past bubbles, notably the funneling of abundant liquidity into speculative vessels, this new wave of online traders has its own, unique aspects of instant sharing of information and opinion through commission-free apps and message boards.[69]

Dow Jones Institutional News (January 30, 2021)

Many others have piled into GameStop, trying to ride the rally "to the moon," as many Reddit investors say. Individual investors have also piled into shares of companies like AMC Entertainment Holdings Inc. in the hopes of catching similar momentum and making a quick buck.[70]

The Milwaukee Journal Sentinel (January 31, 2021)

The traders, communicating on Reddit and other online forums, fomented buying in Koss, GameStop, AMC Entertainment, Tootsie Roll and other stocks with low share prices and trading volume, and in many cases heavy short selling.[71]

New York Times (January 31, 2021)

The company's stock soared an absurd 1,700 percent this month, but not because the company did anything new or special. Instead, it became the focus of hordes of amateur traders — also known as retail investors — who banded together on Reddit message boards and drove up GameStop's stock price by buying tons of its shares through apps like Robinhood and E-Trade.[72]

MarketWatch (February 1, 2021)

The moves by the alternative data company come as videogame retailer GameStop and other companies, like movie chain AMC Entertainment and headphone maker Koss Corp. KOSS, have experienced a parabolic run-up in share values over a short period as investors congregating on

[69] "Up & Down Wall Street: WallStreetBets Might Be New, but Bubbles And Busts Are Not -- Barron's," *Dow Jones Institutional News*, January 30, 2021.
[70] "The Man Who Drove GameStop Mania -- WSJ," *Dow Jones Institutional News*, January 30, 2021.
[71] "Stock Traders Hit with Own Tools," *The Milwaukee Journal Sentinel*, January 31, 2021.
[72] "The Week in Business: GameStop's Bizarre Saga," *NYTimes.com Feed*, January 31, 2021.

Exhibit 11
Selected Press Commentary on Retail Investor Coordination
January 21, 2021 – February 4, 2021

sites like Reddit's r/wallstreetbets, poured millions into heavily shorted companies to spark a rally in those shares.[73]

Barron's (February 2, 2021)

One issue is that the recent short squeeze—which have sent other stocks, including AMC, Bed Bath & Beyond, Macy's, and Stitch Fix, flying—doesn't reflect any underlying change in fundamentals that would point to a sustainably better future for the companies at the heart of the frenzy. The moves were sparked by small investors pouring money into the shares, not any particularly good news on the part of the companies, such as a robust earnings report, which can set off squeezes. And while some have been able to take advantage of their share price appreciation to an extent, there's not a lot different about their outlooks today than at the start of the year.[74]

Forbes (February 2, 2021)

The Reddit rally, meanwhile, continues to unravel Tuesday [February 2]. … "The GameStop nonsense seems to be abating as the fever around that cohort of stocks starts to break," Vital Knowledge Media Founder Adam Crisafulli says, noting that GameStop's short interest has declined precipitously.[75]

Dow Jones Institutional News (February 2, 2021)

Shares of rival chain AMC Entertainment, which had been targeted by Reddit-inspired day traders for a short squeeze, tumbled.[76]

Business Insider (February 2, 2021)

Stocks recently boosted by an army of casual investors sank as profit-taking finally caught up with their weeks-long rallies. GameStop, AMC, and BlackBerry all traded lower, though not harshly enough to erase their steep rallies. Traders in the Wall Street

[73] "GameStop Short Squeeze Fuels New Stock-Market Services Tracking Reddit Messages," *MarketWatch*, February 1, 2021.
[74] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.
[75] "Reddit-Fueled Meme Stocks Are Tanking Again–GameStop Losses Near $14 Billion While Dow Jumps Another 250 Points," *Forbes.com*, February 2, 2021.
[76] "Communications Services Boosted By Cyclical Demand -- Communications Services Roundup," *Dow Jones Institutional News*, February 2, 2021.

Exhibit 11
Selected Press Commentary on Retail Investor Coordination
January 21, 2021 – February 4, 2021

Bets subreddit urged members to keep holding shares, but brokers' trading restrictions and concerns about the bubble bursting have driven selling.[77]

National Post (February 2, 2021)

Downtrodden companies such as GameStop, AMC Entertainment Holdings, Blackberry, Bed Bath & Beyond Inc., Tootsie Roll Industries and even Twinkie-maker Hostess Brands Inc. have suddenly seen their share prices explode higher in the past few weeks, rebranded as "meme stocks" and bid up by a new breed of retail investor. GameStop has been the poster boy for this resurgence and has seen its share price skyrocket as much as 20 times higher this year alone, boosting its market capitalization to US$25 billion and making it larger than companies such as Suncor.[78]

Investor's Business Daily (February 2, 2021)

GameStop, AMC Entertainment and other heavily shorted stocks targeted in a Reddit online forum continued to have huge volume as the short-squeeze trade appears to unwind. [On February 2] GameStop shares plummeted 60% in 76.4 million shares traded, while AMC plunged 41% in 455 million shares.[79]

New York Times (February 3, 2021)

But it's not clear how much longer the Reddit traders can hold the line. Intense media and Wall Street interest pushed many traders into these stocks late last week, with GameStop going as high as $483 last Thursday. They began trading this year at just over $17 a share. The huge run-up in the stock price appears to have little to do with the future prospects of the mall-based retailer, which has been losing money consistently. … "I hope the markets are moving away from some of the issues it dealt with last week and focusing on more of the true fundamentals," Cronk [chief investment officer of Wells Fargo Wealth and Investment Management] said.[80]

Postmedia Breaking News (February 3, 2021)

[77] "Dow Climbs 345 Points as Concerns of Reddit-Fueled Volatility Cool," *Business Insider*, February 2, 2021.
[78] "Market Scheme Like Wolf of Wall Street on Steroids," *National Post*, February 2, 2021.
[79] "Stocks Extend Rebound As Market Risk Suddenly Eases; 3 Reasons For Caution," *Investor's Business Daily*, February 2, 2021.
[80] "Big Tech and Banks Buoy the Market," *New York Times*, February 3, 2021.

Exhibit 11
Selected Press Commentary on Retail Investor Coordination
January 21, 2021 – February 4, 2021

Other so-called "meme stocks" caught up in the Reddit rally rose on Wednesday, with headphone maker Koss Corp and home furnishing retailer Bed Bath & Beyond rising 27% and 2.2%, respectively. BlackBerry Ltd's U.S.-listed shares were down 3.2% following a 21% slide a day earlier.[81]

Barron's (February 4, 2021)

Tootsie Roll Industries tends to be a fairly sleepy stock. Yet so far this year, the sweets maker has been riding the same wave as GameStop.[82]

Forbes (February 4, 2021)

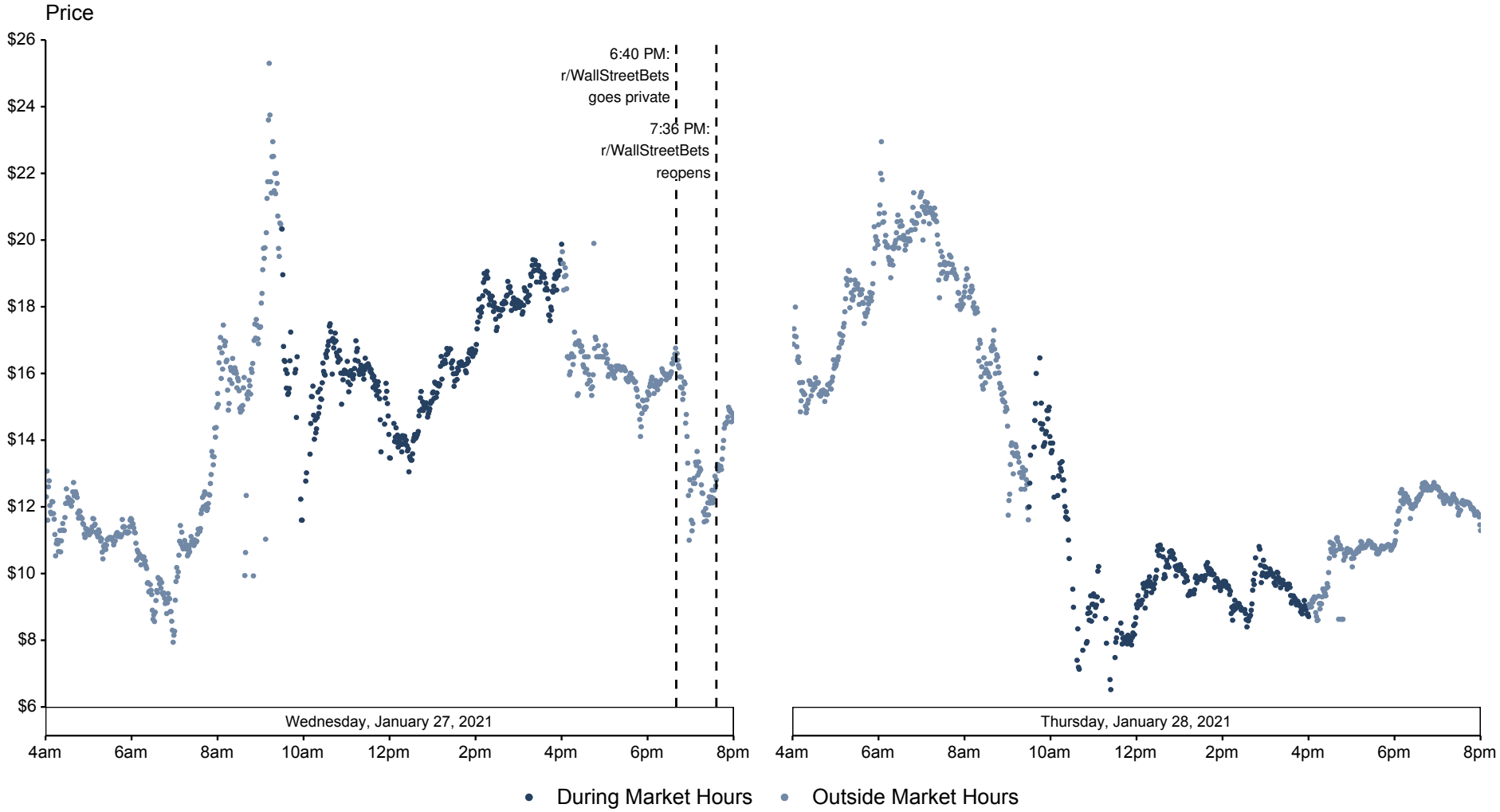
After plunging 60% Tuesday and Wednesday, shares of GameStop are plunging an additional 30% Thursday (as of 11:30 a.m.), wiping out nearly two weeks of monster gains and pushing the firm's market capitalization down to $4.5 billion from a closing peak last Wednesday of $24.3 billion. The losses are piling on after Bank of America analyst Curtis Nagle said in a Thursday [February 4] note to clients that dwindling online conversation, short interest and daily trading volume in GameStop shares should contribute to prices reverting back toward levels backed by fundamentals.[83]

Dow Jones Institutional News (February 4, 2021)

Koss, along with GameStop Corp., was one of several companies that saw their share prices skyrocket … in recent weeks as retail traders invested heavily in them.[84]

[81] "Swings in Some Reddit Favorites Ease; Yellen Eyes Stock Volatility," *Postmedia Breaking News*, February 3, 2021.
[82] "Tootsie Roll Takes a Wild Ride With Short Squeeze. The Stock Has Given Up Most of Its Gains This Year.," *Barron's Online*, February 4, 2021.
[83] "Meme Stocks Crash Again: GameStop Losses Hit $20 Billion In One Week As Reddit-Fueled Mania Subsides," *Forbes.com*, February 4, 2021.
[84] "Koss Insiders Cash More Than $40 Million in Headphone Maker's Shares," *Dow Jones Institutional News*, February 4, 2021.

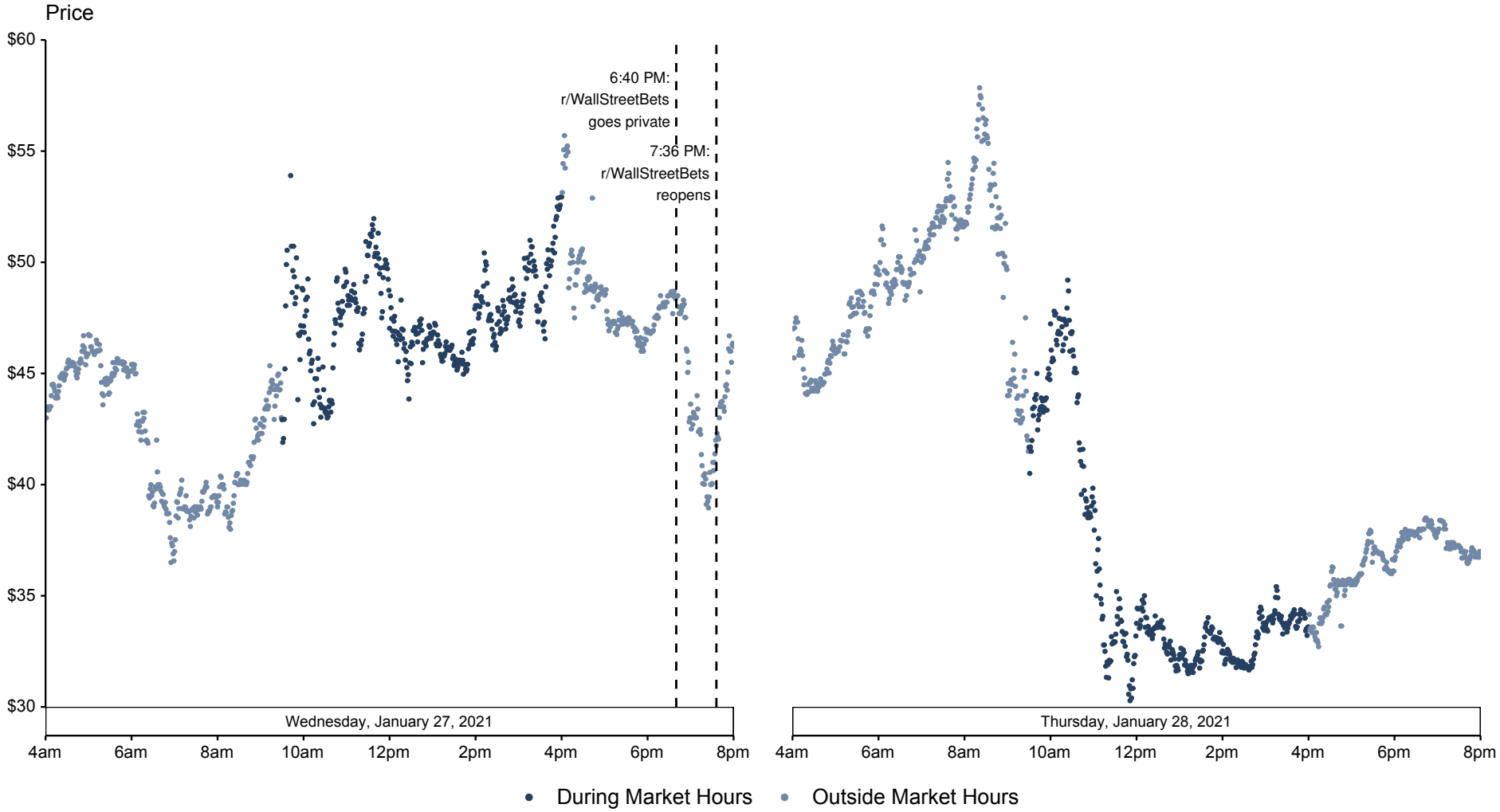
Exhibit 12A
AMC Entertainment Holdings, Inc.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

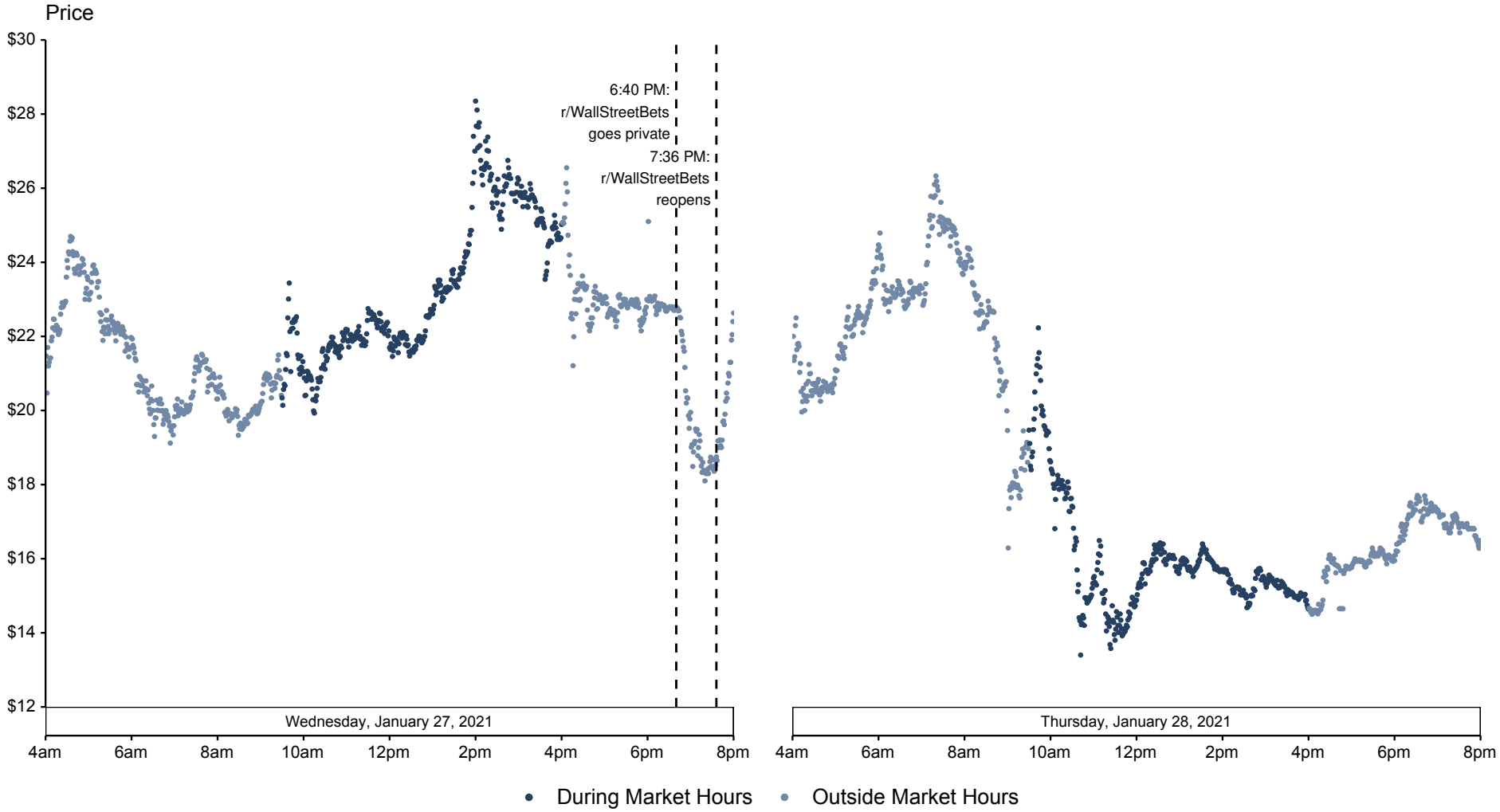
Exhibit 12B
Bed Bath & Beyond, Inc.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

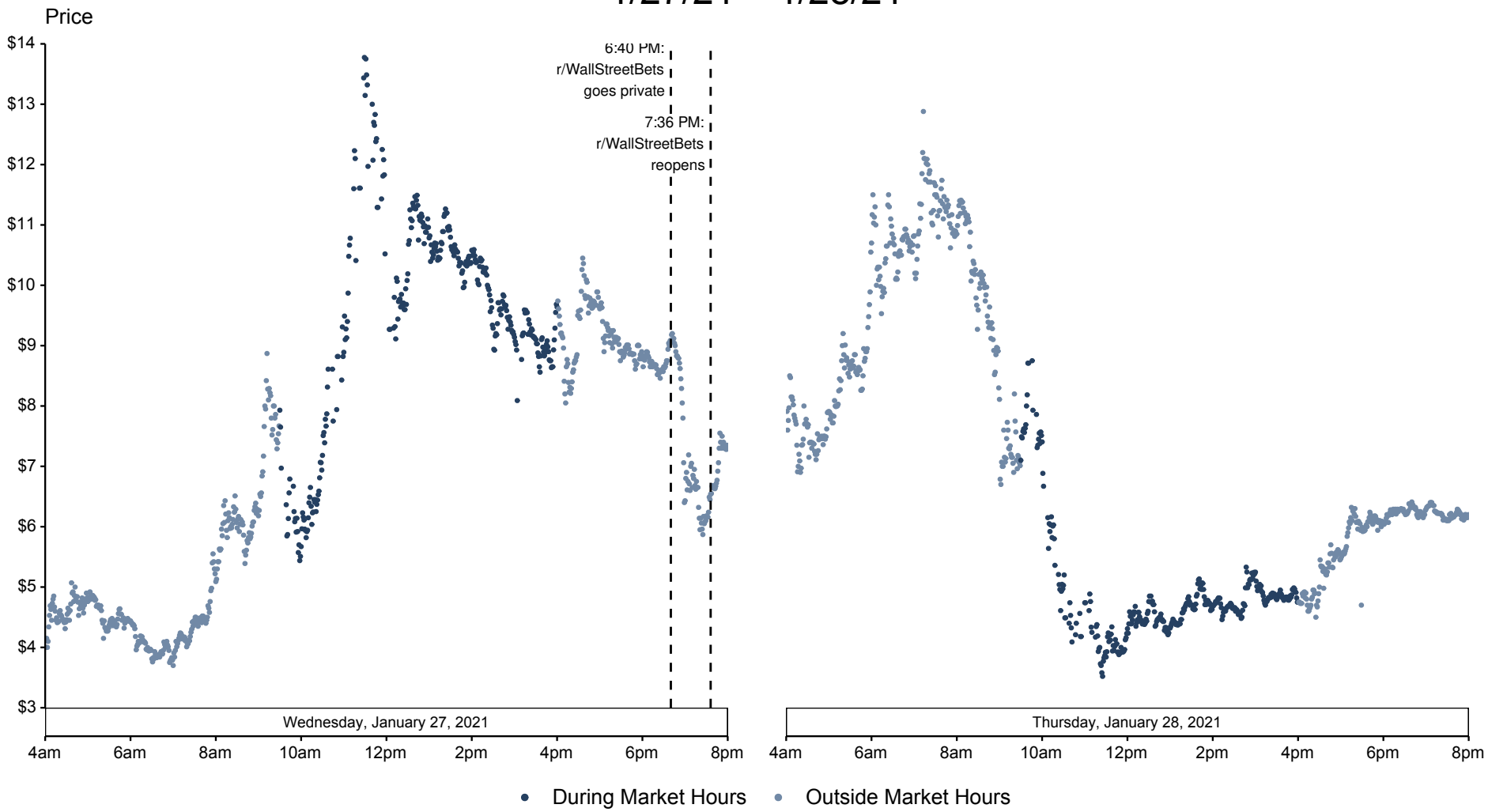
Exhibit 12C
BlackBerry Limited
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

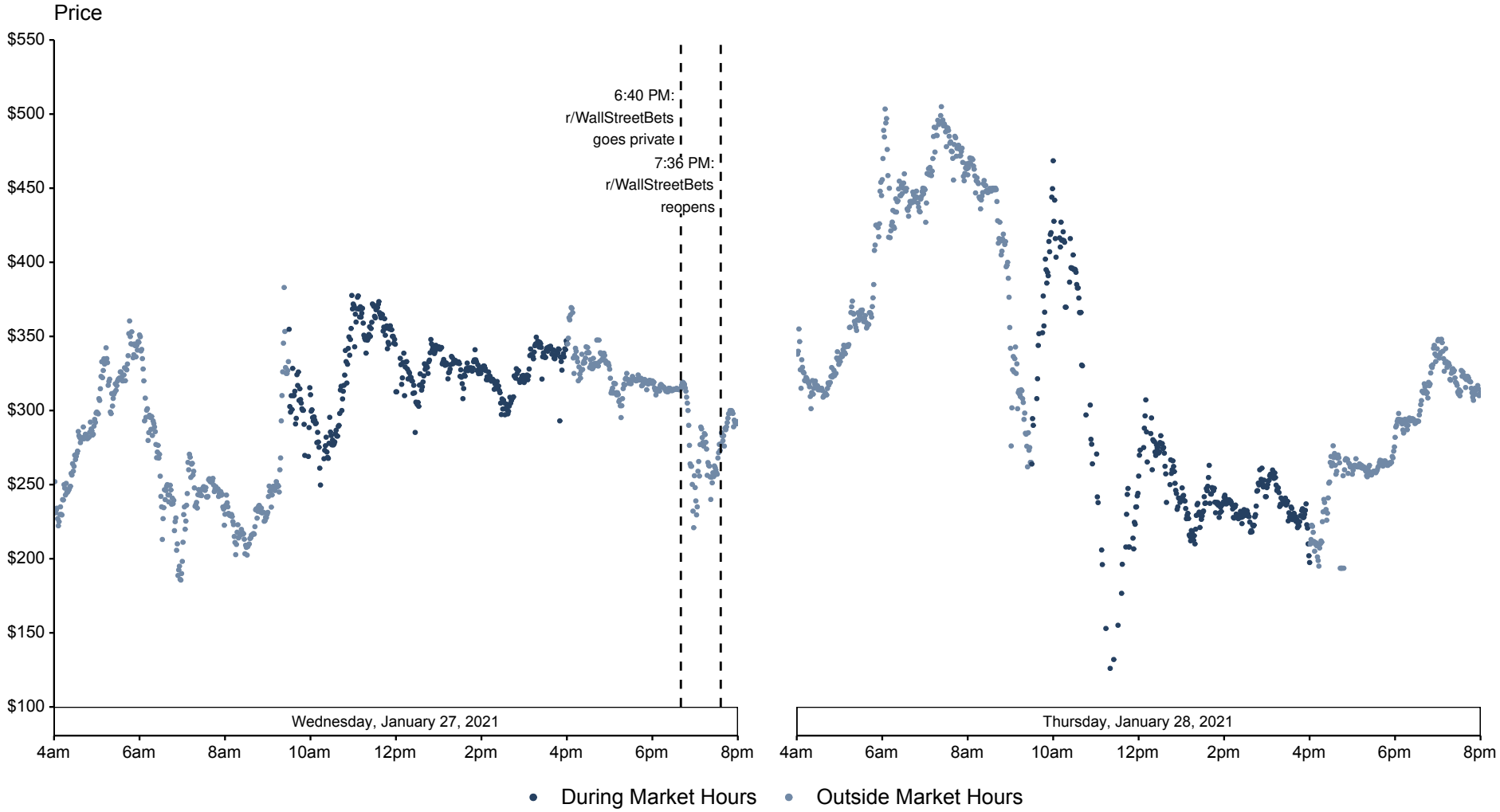
Exhibit 12D
Express, Inc.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

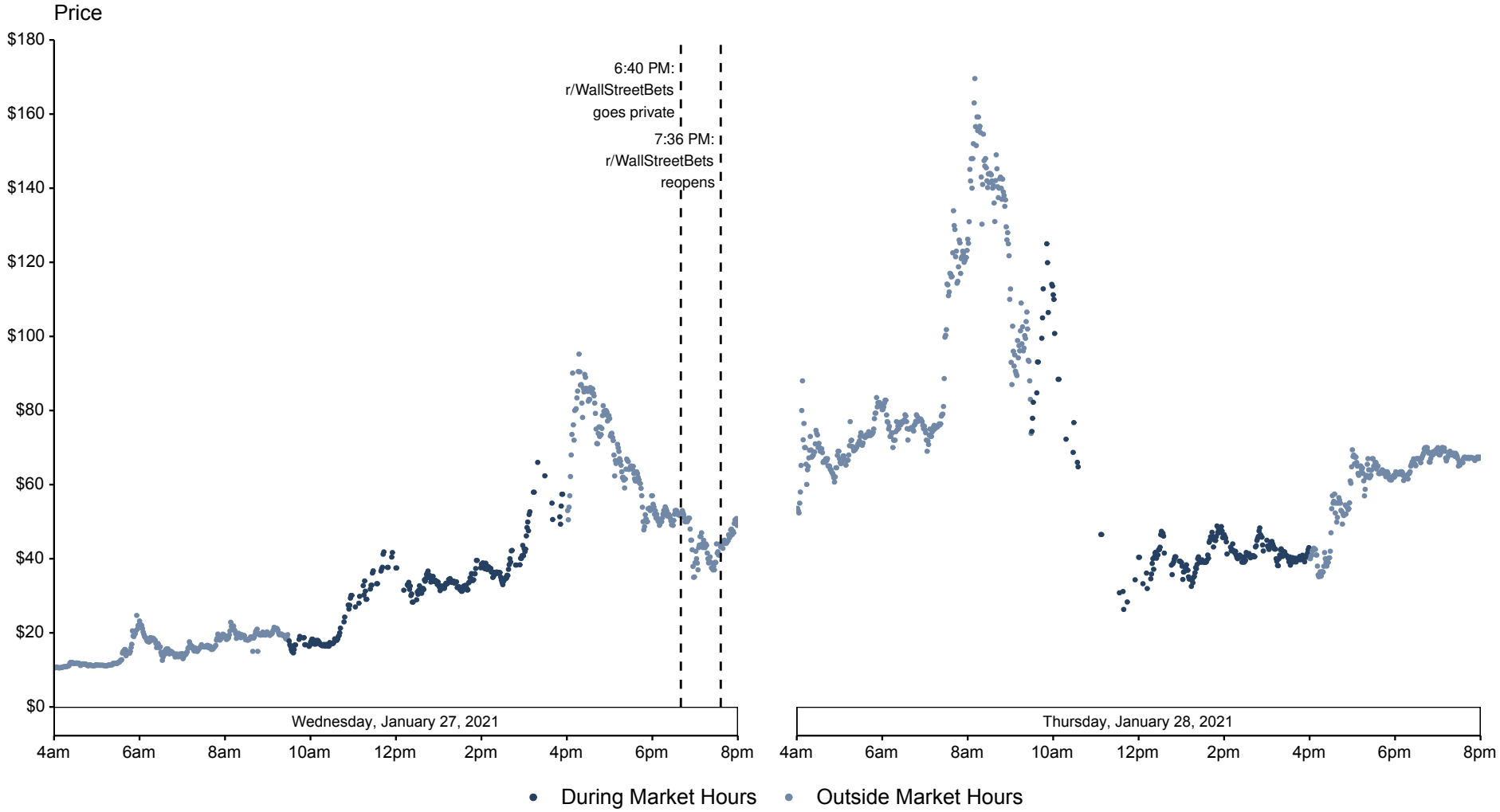
Exhibit 12E
GameStop Corp.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

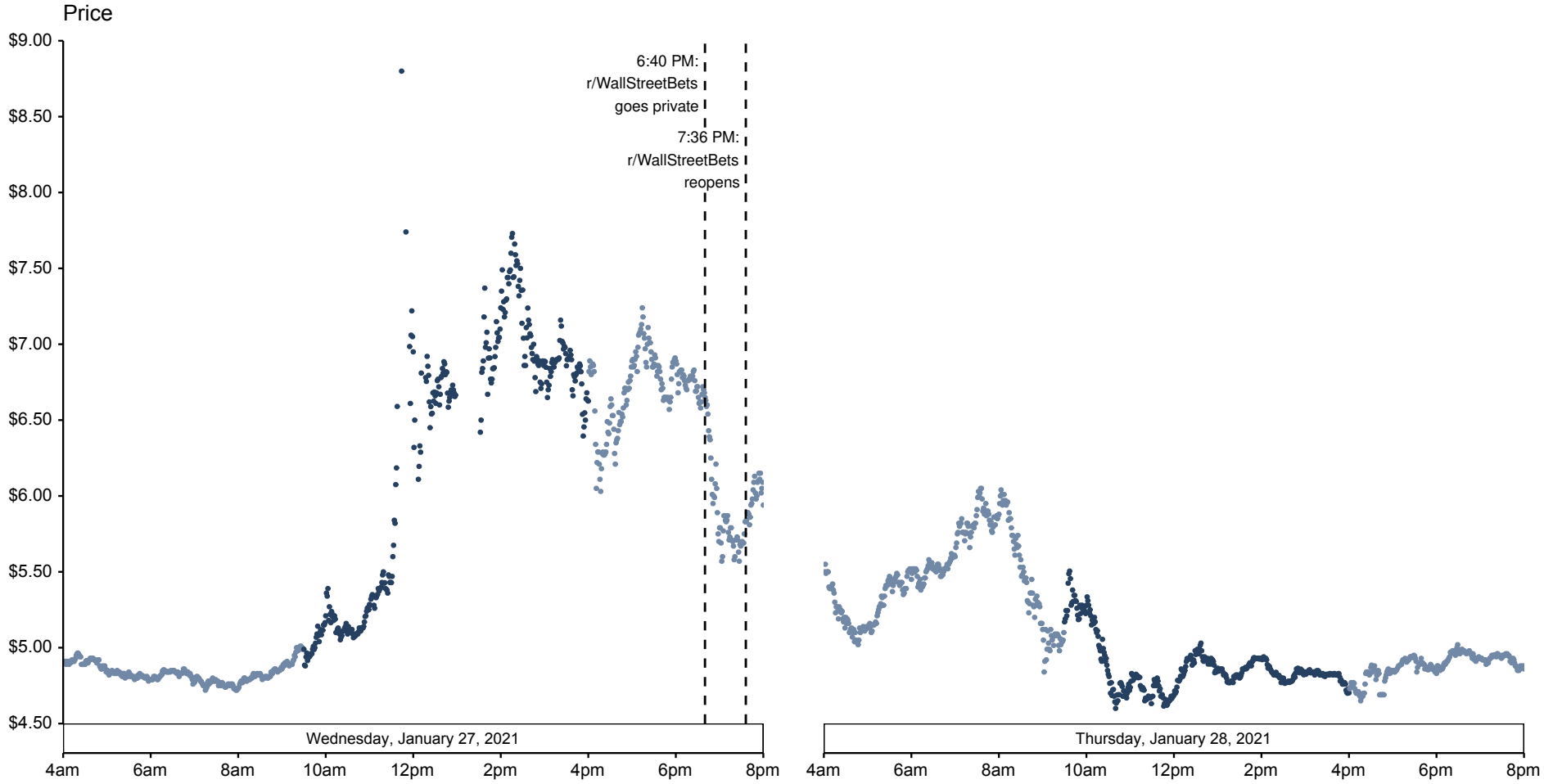
Exhibit 12F
Koss Corporation
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

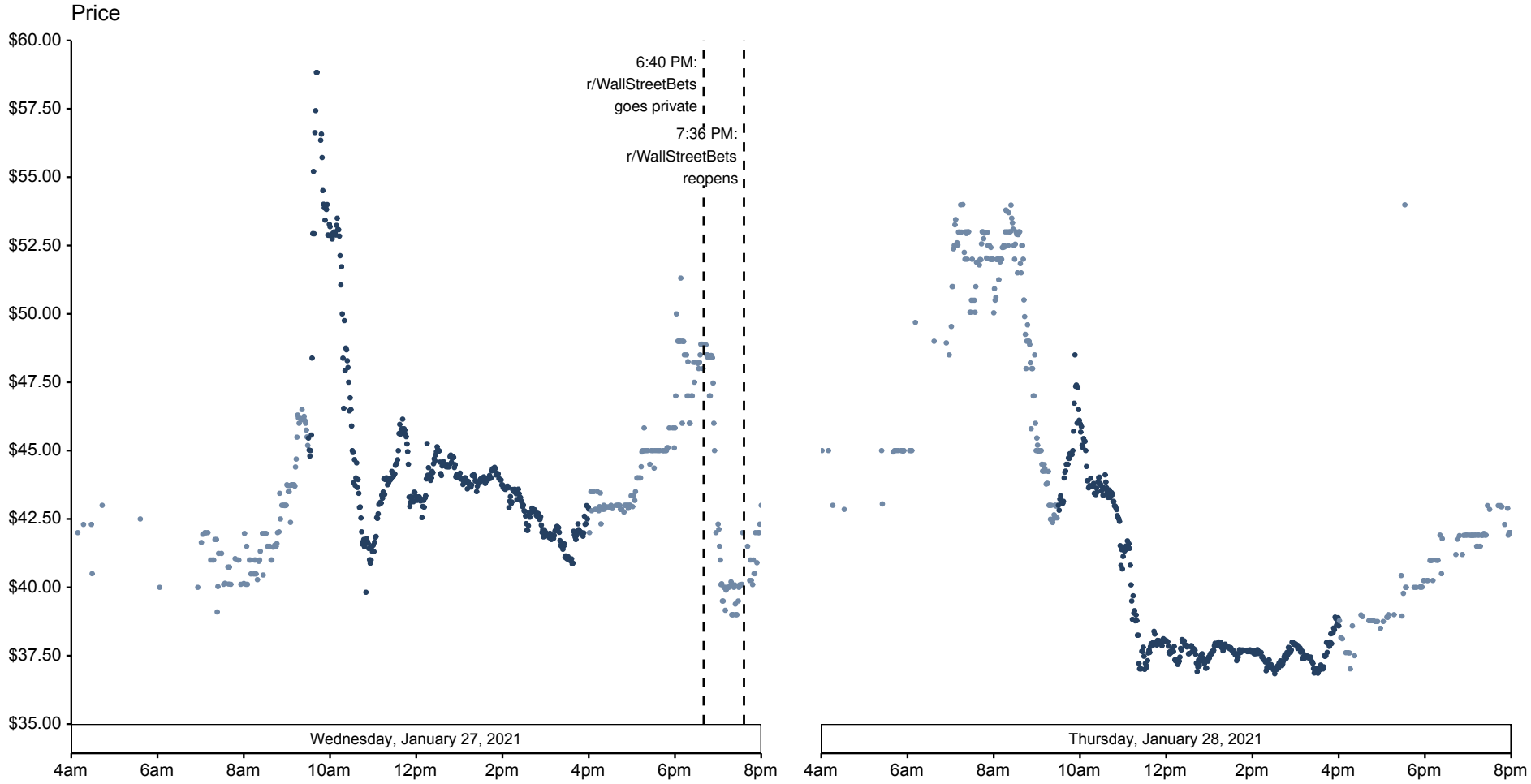
Exhibit 12G
Nokia Corporation
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

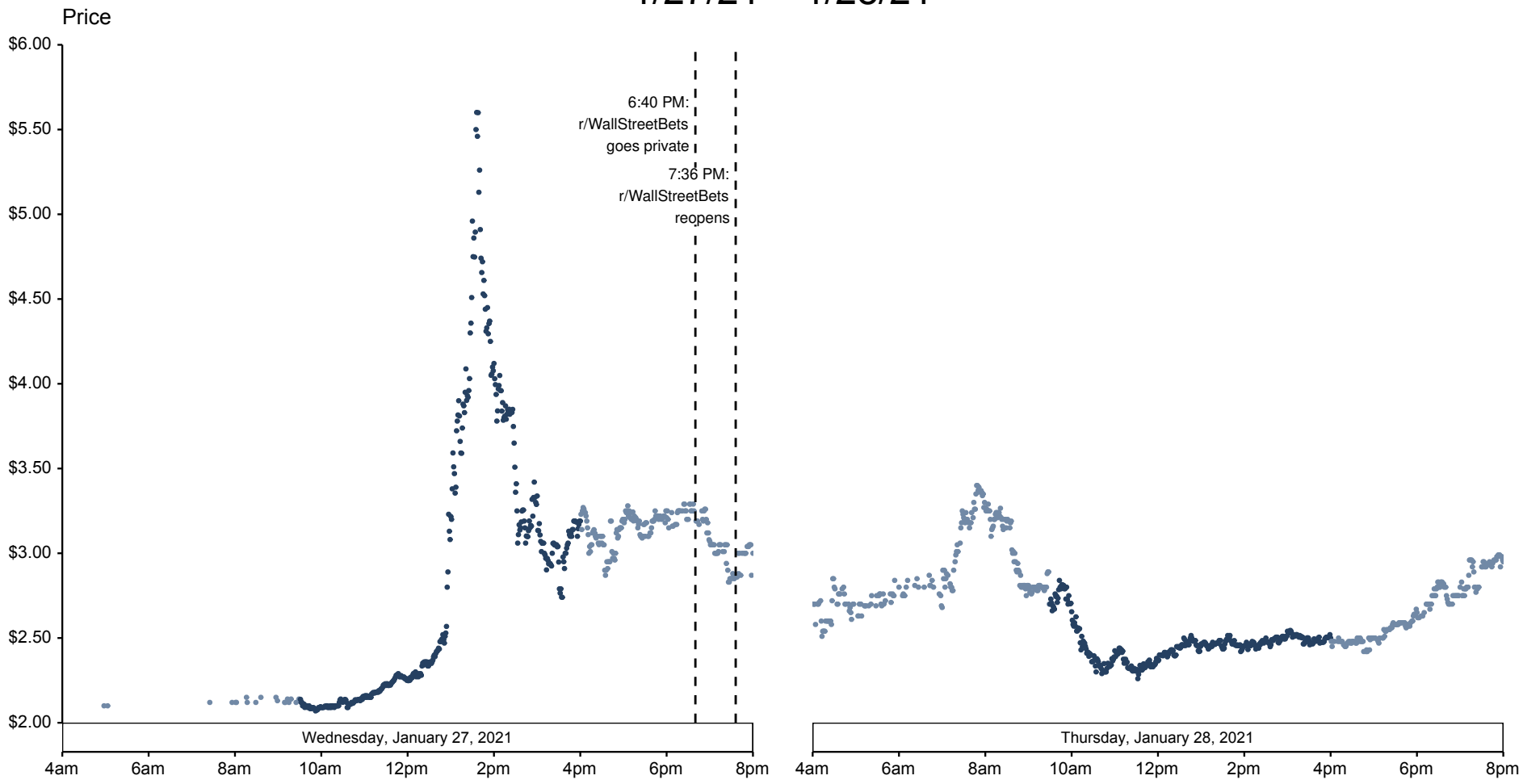
Exhibit 12H
Tootsie Roll Industries, Inc.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

Exhibit 12I
trivago N.V.
Intraday Price Analysis
1/27/21 – 1/28/21



Source: Tick Data; "Discord bans WallStreetBets as subreddit briefly goes private [Updated]," *Ars Technica,* January 28, 2021, available at https://arstechnica.com/gaming/2021/01/discord-bans-wallstreetbets-as-subreddit-briefly-goes-private/

Note: Tick Data provides intraday prices on a one minute interval.

Exhibit 13
Selected Analyst Commentary on Potential Short Squeeze and Coordinated Short Squeeze Attempts
January 21, 2021 – March 31, 2021

Telsey Advisory Group (January 25, 2021)

The sudden, sharp surge in GameStop's share price and valuation likely has been fueled by a short squeeze. …[1]

Wedbush (January 25, 2021)

We are cautious on shares of Express, after rocketing 150% in the last two trading days on the heels of retails wider squeeze-play with most-shorted stocks up +14% versus least-shorted stocks +4% in the RUA index so far in 2021, coupled with an investor stampede following Will Meade's (Twitter personality and former pm) speculative tweet. Meade's speculation pegs Express as the next GameStop. …[2]

Credit Suisse (January 26, 2021)

… AMC's recent rally (+110% YTD) has been driven by retail investors buying shares in order to trigger a short squeeze.[3]

Raymond James (January 26, 2021)

With the environment roughly the same, the recent stock surge is more a result of a short squeeze against highly shorted retail names (see GME and AMC). While predicting when this activity will end is challenging, we think it is prudent to take a breather on our positive rating as BBBY is now trading at ~21.2x our FY21 adj. EPS estimate of $1.45 (~25x the consensus $1.25). … In addition, with the recent stock surge most likely coming from a short squeeze versus fundamental new holders, BBBY could give back some of its recent gains. For reference, average trading volume over the last 3 trading days has been ~48M shares (with ~89M on Monday) versus the three-month daily average of ~10M shares.[4]

S3 Partners (January 26, 2021)

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[1] "GME - Downgrading to Underperform; Disconnect Between Fundamentals and Valuation," *Telsey Advisory Group*, January 25, 2021.
[2] "Cautious on Heels of Squeeze Play Coupled with Stampede Following Speculation," *Wedbush,* January 25, 2021.
[3] "AMC Gets its $1b: Management Sees Liquidity into 2H21 After Odeon Financing and Equity Raise," *Credit Suisse*, January 26, 2021.
[4] "Taking a Breather For Now; Downgrading to Market Perform," *Raymond James*, January 26, 2021.

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We are still seeing a short squeeze on existing older shorts, with these more value-based short sellers trimming or closing their positions due to large mark-to-market losses.[5]

BofA Securities (January 27, 2021)

Over the past two weeks, GameStop (GME) shares have risen spectacularly on what media reports described as a major short squeeze, in part enabled by extreme retail investor enthusiasm.[6]

BofA Securities (January 28, 2021)

We are downgrading BBBY to Neutral from Buy following a significant increase in share price and valuation. Since Jan. 21 shares have risen 97% (vs. -2.7% for the S&P500). With no significant news specific to the company announced or changes in consensus earnings, the increase in share price appears to be driven solely by a short squeeze (64% of shares were short at YE20) and high retail enthusiasm.[7]

Telsey Advisory Group (January 28, 2021)

The sudden, sharp surge in Bed Bath & Beyond's share price and valuation likely has been fueled by a short squeeze, given the high short interest (over 60%), and speculation by retail investors, fueled in chat rooms, much like GameStop.[8]

CFRA (January 30, 2021)

We attribute GME's explosive upside movement to a mega short squeeze (short interest more than 100% of total float), and we think shares are primed for a crash in 2021.[9]

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[5] "S3 Analytics: GameStop Shorts Down $5 Billion in 2021," *S3 Partners*, January 26, 2021.
[6] "The Gravity of GME's Earnings Will Likely Weigh on Shares Again; PO to $10; Reit U/P," *BofA Securities*, January 27, 2021.
[7] "Still See a Great Turnaround Taking Shape but Big Price Move Takes Us to Neutral," *BofA Securities*, January 28, 2021.
[8] "BBBY - Downgrading to Market Perform; Too Far, Too Fast for a Turnaround Story," *Telsey Advisory Group*, January 28, 2021.
[9] "GameStop Corp.," *CFRA*, January 30, 2021.

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Credit Suisse (February 1, 2021)

Over the last few weeks, several dramatic "short squeezes" were occurring in parallel which accelerated into last week. Specifically, day traders have been reportedly aggressively buying the securities of several out-of-favor and heavily shorted US companies including AAL, AMC, BB, BBY, CTRM, EXPR, GME, KOSS, NAKD, NOK, SNDL, TR and TRVG. This caused the underlying stock prices to increase rapidly which then in turn encouraged more buying from both retail investors and short covering from institutional investors.[10]

Scotiabank (February 1, 2021)

Blackberry had already been rising in rankings since its September trough on improving Momentum and somewhat better LT EPS trends. Still, it went into overdrive this month as retail investors' interest tried to drive a short squeeze. … Moreover, Growth rankings have not picked up all that much. While LT EPS Growth rankings have been turning higher as the company has been profitable for the first time in three years, LT SPS trends remain flat to down and Earnings Revisions have barely turned positive this month. Hence, the recent move upward seems to be overdone and could expose investors blindly following Momentum to a snapback if sentiment turns.[11]

BofA Securities (February 4, 2021)

In our view, one of the major causes (along with very high short interest and trading volumes) for GME's share price increase is increased participation by retail investors which appears to have been exacerbated by social media platforms such as Twitter and Reddit. While still high on a relative or historic basis, GME mentions on Reddit (including on the wallstreetbets forum), short interest, and trading volumes have all declined significantly from recent peaks over the past several days. This has corresponded with a drop in GME's share price which is now $92.41 as of the market close on February 3rd, from an intraday high of $483 on January 28th. … A considerable decline in short interest (now about 40% of shares from a peak of 140%) may also provide less potential for short squeezes.[12]

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[10] "US Online Brokers: Heightened Activity in Certain Stocks (AMC, GME) and the Impact on Brokers (SCHW, IBKR)," *Credit Suisse*, February 1, 2021.
[11] "Quantitative Strategy: Value-Momentum Remains Best Bet," *Scotiabank,* February 1, 2021.
[12] "When Fundamentals Still Appear on the Sidelines, What Other Factors Matter," *BofA Securities*, February 4, 2021.

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CFRA (February 4, 2021)

Our action [reducing to "sell" from "hold"] is based on valuation, with potential downside to our 12-month target, which we keep at $2.50, noting its extreme volatility in the past week amid indications of a potential short squeeze.[13]

BofA Securities (February 11, 2021)

Over the past several weeks, BBBY's shares experienced a significant increase on the back of a short squeeze and high retail enthusiasm. This occurred in a period where there were no changes to fundamentals or earnings.[14]

Canaccord Genuity (February 16, 2021)

[W]ith the volatility in the shares following recent unusual trading activity from a targeted short squeeze, the share price is above our increased price target, resulting in our downgrade to SELL. … Share price up ~100% in C2021: BlackBerry shares have appreciated ~100% as part of a Reddit driven rally. While the shares are ~50% below the January 27 closing price of $25.10, our analysis leads us to believe the shares are still overvalued.[15]

Wells Fargo (March 11, 2021)

BBBY shares have caught fire (+59% YTD vs. +4% SPX) on the back of activist-driven turnaround hopes, buybacks via asset sales and a prolific short squeeze. But amidst the noise, fundamentals remain underwhelming, and we expect similar meager performance in Q4.[16]

[13] "CFRA Reduces Opinion on Shares of AMC Entertainment to Sell from Hold," *CFRA*, February 4, 2021.
[14] "Remain Positive on Turnaround and Upgrade to Buy on Share Pull Back," *BofA Securities*, February 11, 2021.
[15] "Anticipate Gradual Software & Services Recovery and Increasing PT to $10, but Downgrade to SELL on Valuation," *Canaccord Genuity*, February 16, 2021.
[16] "Comfortable at Home. For Now. Thoughts into Upcoming Q4 Prints," *Wells Fargo*, March 11, 2021.

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Dow Jones Institutional News (January 22, 2021)

GameStop shares surge, setting an all-time intraday record after getting a boost from the ongoing battle between day traders and short-sellers. … A quarrel over GameStop between short-seller Citron Research and day traders on Twitter points to a possible effort by individual investors to squeeze short-sellers.[1]

Business Insider (January 25, 2021)

Names like GameStop, BlackBerry, and AMC Entertainment have soared hundreds of percentage points in recent weeks with little fundamental news behind the moves. The rallies were likely sparked [by] a short squeeze event in the shares, which further fueled the sky-high surges. A short squeeze is when short-sellers are forced to buyback the stock to close out their losing positions, boosting demand for the stock in question.[2]

Dow Jones Institutional News (January 25, 2021)

"The sudden, sharp surge in GameStop's share price and valuation likely has been fueled by a short squeeze, given the high short interest (still +100%) … ," [Tesley Advisory Group Analyst Joseph Feldman] wrote.[3]

Dow Jones Institutional News (January 25, 2021)

The buying pressure [from retail investors] has led money managers to switch out of substantial bets that the stock [GME] would fall, analysts said. This resulted in a short squeeze…[4]

Dow Jones Institutional News (January 25, 2021)

[1] "GameStop Surges as Day Traders Squabble With Short Sellers -- Market Talk," *Dow Jones Institutional News*, January 22, 2021.
[2] "From AMC to Bed Bath & Beyond, the Market's Most-Shorted Stocks Are Rallying as Reddit Day-Traders Pile In," *Business Insider*, January 25, 2021.
[3] "GameStop Stock Sets Record and Returns to Earth -- Barrons.com," *Dow Jones Institutional News*, January 25, 2021.
[4] "GameStop Shares Surge Toward Fresh Record Ahead of Opening Bell," *Dow Jones Institutional News*, January 25, 2021.

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Attention from individual investors has provided support for shares tied to the market's most volatile names, a group that includes AMC and videogame retailer GameStop Corp. Individual investors are encouraging each other on online forums to purchase shares and options tied to these companies, in part to squeeze bets from other investors that shares would fall.[5]

Business Insider (January 26, 2021)

Retail investors further boosted Reddit-favorites including GameStop, AMC Entertainment, and BlackBerry following Monday's rallies. Posts on online forums such as WallStreetBets boasting outsized gains have fueled momentum for such stocks in recent sessions. Online traders continue to urge each other to buy more shares, aiming to further squeeze short-sellers and lengthen the rally.[6]

Business Insider (January 26, 2021)

Retail investors, including members of the Reddit forum r/wallstreetbets, have made concerted efforts to drive GameStop shares higher and squeeze short-sellers such as Melvin Capital. They helped to send GameStop's stock price up as much as 145% on Monday, then as much as 69% on Tuesday.[7]

Business Insider (January 26, 2021)

A tweet from @realwillmeade highlighted high short interest and a low share price for Koss. … The stock has rallied for two days. … [The tweet read:] "What short names will the Reddit Wall Street Bets army go after next? Here are the 3 stocks with short interest above 35% and a price below $10! $AMC $CLVS $KOSS." … [Koss's] sudden and meteoric rise follows rallies in the share price of companies like GameStop, BlackBerry, and AMC Entertainment, which have surged hundreds of percentage points in recent weeks with little fundamental news behind the moves.[8]

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[5] "AMC Nets $917 Million in Financing to Ward Off Bankruptcy -- Update," *Dow Jones Institutional News,* January 25, 2021.
[6] "US Stocks Edge Lower Ahead of Major Earnings Reports," *Business Insider*, January 26, 2021.
[7] "'Big Short' Investor Michael Burry Blasts Reddit-Fueled GameStop Rally as 'Unnatural, Insane, and Dangerous,'" *Business Insider*, January 26, 2021.
[8] "Koss Shoots 131% Higher as Tweet Pegs the Small-Cap Headphones Maker as a Possible Next WallStreetBets Darling," *Business Insider*, January 26, 2021.

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Business Insider (January 26, 2021)

Scores of retail investors, including some members of Reddit forum r/wallstreetbets, have targeted heavily shorted stocks in recent weeks. They drove GameStop's stock price up as much as 145% on Monday, Bed Bath & Beyond up 58%, BlackBerry up 48%, and AMC up 39%.[9]

Dow Jones Institutional News (January 26, 2021)

Several stocks have been soaring past nosebleed levels because short sellers have had to cover their positions, or buy back the stock, before it rises too fast. …[10]

Dow Jones Institutional News (January 26, 2021)

… [T]he biggest reason the shares [in GME] have more than doubled in 2021 is the extraordinarily high short interest in the stock. In fact, more than 100% of the shares available for trading (or the "float") had been borrowed by short sellers to bet against the stock as of the end of last year. That short interest remains high. … Steve Sosnick, the chief strategist at Interactive Brokers, said in an interview that short sellers should be on alert. "I believe there is a systematic targeting of highly shorted stocks," he said.[11]

Dow Jones Institutional News (January 26, 2021)

Bed Bath's major rally is part of a larger pattern of heavily shorted stocks soaring, and in some cases quickly reversing course. Bears have been getting squeezed in their bets -- although not all are willing to give up their positions -- feeding into the frenzy.[12]

Dow Jones Institutional News (January 26, 2021)

[9] "The Firms of Billionaire Investors Steve Cohen and Ken Griffin Pour $2.8 Billion into a GameStop Short-Seller That's Lost 30% This Year," *Business Insider*, January 26, 2021.
[10] "The Dow Slipped 23 Points Because a Broad Short Squeeze Brought the Pain -- Barrons.com," *Dow Jones Institutional News*, January 26, 2021.
[11] "Another GameStop? Here Are the Next 10 Most Shorted Small-Caps. -- Barrons.com," *Dow Jones Institutional News*, January 26, 2021.
[12] "Bed Bath & Beyond Gets Hit With Two Downgrades Amid Major Rally -- Barrons.com," *Dow Jones Institutional News*, January 26, 2021.

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GameStop (GME) is the recent poster child for this. The shares, which are jumping 17% again at recent check, have soared 332% since the start of the year. This short squeeze has caused bears to get creative, but it has also spilled into other stocks with high short interest. Bed Bath & Beyond (BBBY) stock is another example. It was hit with two downgrades today, as analyst are unwilling to keep raising their target prices after the shares surged more than 70% in just over three weeks.[13]

Dow Jones Institutional News (January 26, 2021)

… Tom Essaye, founder of Sevens Report Research … mentioned the activities of short sellers were also causing selling pressure in the morning. Several stocks have been soaring past nosebleed levels because short sellers have had to cover their positions, or buy back the stock, before it rises too fast, as there were few shares left to be shorted. GameStop (GME) stock rose 92%. Bed Bath & Beyond (BBBY) stock rose 20%. AMC Entertainment (AMC) rose stock 12%.[14]

Forbes (January 26, 2021)

A social media-organized squeeze has taken place in January, which has fueled a 881% gain in GameStop shares over the past month.[15]

Investor's Business Daily (January 26, 2021)

Bed Bath & Beyond and Dillard's, two other short-squeeze plays, jumped 20% Tuesday. BBBY stock kept running overnight.[16]

MarketWatch (January 26, 2021)

[13] "Beyond Meat Stock Surges on PepsiCo Partnership. There Could Be More Behind the Move. -- Barrons.com," *Dow Jones Institutional News*, January 26, 2021.
[14] "The Dow Slipped 23 Points Because a Broad Short Squeeze Brought the Pain -- Barrons.com," *Dow Jones Institutional News,* January 26, 2021.
[15] "The Hedge Fund Genius Who Started GameStop's 4,800% Rally Now Calls It 'Unnatural, Insane, And Dangerous,'" *Forbes.com*, January 26, 2021.
[16] "Dow Jones Futures: GME Stock Rockets On Elon Musk Tweet; Microsoft, AMD, Palantir Are Key Movers," *Investor's Business Daily*, January 26, 2021.

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The investor group whose concerted action has apparently created a short squeeze in the stock of videogame retailer GameStop Inc. is also targeting shares of AMC Entertainment Inc., BlackBerry Ltd and retailer Express Inc., all of which are seeing sharp moves without any apparent news to act as a driver.[17]

Al Jazeera (January 27, 2021)

Euphoria born in day-trader chat rooms has turned GameStop into the biggest story stock of the retail era, its improbable surge an emblem of the newfound power of individual investors. At the same time, it's become a major headache for institutional investors betting it would fall. An epic short squeeze lifting the shares has set off a search for other companies that might be similarly vulnerable, with Express Inc., Bed Bath & Beyond Inc. and AMC Entertainment Holdings Inc. among stocks surging in premarket trading on Wednesday.[18]

Barron's (January 27, 2021)

Several factors have cast new light on BlackBerry (ticker: BB) shares in recent weeks, although none quite explain the dramatic surge in interest in the stock. Some observers link the rally to a short squeeze driven by heightened attention from retailer investors.[19]

Forbes (January 27, 2021)

Like GameStop and AMC, many of the stocks fueling the Reddit trade are among the most shorted stocks in the market, including Bed Bath & Beyond, Ligand Pharma and National Beverage Corp, which are up 28%, 18% and 36% Wednesday afternoon while the broader market struggles to stay afloat.[20]

Forbes (January 27, 2021)

… [S]hares of massively shorted stocks with big retail interest still saw eye-popping gains, with GameStop up 135%, after climbing 93% Tuesday, and embattled movie theater chain AMC

[17] "Here Are Some of the Other Stocks Seeing GameStop-like Short Squeezes," *MarketWatch*, January 26, 2021.
[18] "GameStop Shares Keep Surging as Day Traders Keep Upper Hand," *Al Jazeera*, January 27, 2021.
[19] "BlackBerry Stock Extends Rally Despite Downgrade," *Barron's Online*, January 27, 2021.
[20] "Not Just GameStop: Here Are The Meme Stocks WallStreetBets Traders Are Pumping Up During This 'Extremely Erratic' Reddit Rally," *Forbes.com*, January 27, 2021.

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Entertainment up a staggering 302%. … "Wednesday's price action can't be blamed on fundamentals, but instead comes down to crowded positioning, expensive valuations, the [uncertain] stimulus narrative and market nonsense," says Crisafulli [founder of Vital Knowledge Media and former JP Morgan market commentary contributor]. "The extreme short squeezes, the ongoing dump of fresh supply each and every day and the examples of froth are all slowly eroding confidence."[21]

Forbes (January 27, 2021)

Shares of embattled movie theater operator AMC Entertainment are on a volatile tear Wednesday, at one point surging more than 300% as frenzied buying continues from retail traders actively trying to squeeze out Wall Street shops from some of the most heavily shorted stocks on the market. … As of 11:00 a.m. shares of AMC Entertainment, one of last year's worst-performing stocks, has surged more than 200% Wednesday, hitting more than $15 per share–nearly seven times the average analyst price target. Along with GameStop–which is heading up much of the wild short squeeze–AMC Entertainment is one of the market's most heavily shorted stocks, counting some $730 million in short interest as of Tuesday afternoon, according to data from S3 Partners. At-home traders on Reddit's r/WallStreetBets' Discord server spent much of Tuesday night creating memes to convince people to buy AMC stock, The Verge reported Wednesday, with hundreds at one point infiltrating a Twitch stream from rapper Soulja Boy in an attempt to get him to hype up AMC.[22]

Investor's Business Daily (January 27, 2021)

Another short-squeeze play, AMC stock, skyrocketed as much as 310% Wednesday morning to 20.36 before trimming gains to 194%.[23]

Investor's Business Daily (January 27, 2021)

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[21] "Dow Plunges 650 Points, Posting Worst Loss In 3 Months As Reddit Traders Fuel 'Market Nonsense,'" *Forbes.com*, January 27, 2021. See "Quick overview," *Vital Knowledge*, available at https://vitalknowledge.net/about-us.

[22] "Another Wild Reddit Rally As AMC Surges 300%, Online Brokers Crash, Shares Are Halted And Short-Sellers Cede Losses," *Forbes.com*, January 27, 2021.

[23] "Dow Jones Dives As Apple, Tesla Earnings Loom; GME Doubles, While AMC Stock Skyrockets 300%," *Investor's Business Daily*, January 27, 2021.

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While short squeezes like GME stock and AMC stock kept defying gravity and just about everything else, leading stocks struggled once again.[24]

Investor's Business Daily (January 27, 2021)

The GME stock short squeeze continued Wednesday morning, as shares surged as much as 140% to top out at 355. … Melvin Capital, which had been a high-profile short seller of GME stock, closed out its short position on Tuesday, the hedge fund's manager told CNBC.[25]

Investor's Business Daily (January 27, 2021)

The social media-driven GME stock short squeeze, egged on by Elon Musk, surged before the open but slashed gains as Melvin Capital and Citron Research closed short positions.[26]

New York Times (January 27, 2021)

A big worry is that this has become a short-squeeze revolt. Short-sellers were down $91 billion for the month through yesterday, according to data from S3. … While much of that was because of the overall rise in stocks, shares in other heavily shorted companies, like the headphone maker Koss, are up big. "I believe there is a systemic targeting of highly shorted stocks," said Steve Sosnick of Interactive Brokers.[27]

New York Times (January 27, 2021)

That's what is happening with GameStop. As retail investors began to buy up its shares and options – many of them egged on by Wall Street Bets and other forums – its stock began to

[24] "Dow Jones Futures: Stock Market Rally Sells Off As AMC, GME Stock Erupt; Apple, Facebook, Tesla Earnings In Focus," *Investor's Business Daily*, January 27, 2021.
[25] "Dow Jones Dives As Apple, Tesla Earnings Loom; GME Doubles, While AMC Stock Skyrockets 300%," *Investor's Business Daily*, January 27, 2021.
[26] "Dow Jones Futures Fall: GME Stock Rockets On Elon Musk Tweet, Slashes Gain On Melvin Capital News; Microsoft Breaking Out," *Investor's Business Daily*, January 27, 2021.
[27] "Can Anything Stop GameStop?" *NYTimes.com Feed*, January 27, 2021.

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surge, forcing the short-selling hedge funds to buy back the borrowed shares at a higher price, which itself pushed the stock price higher. In Wall Street parlance, this is a "short squeeze." …[28]

Reuters News (January 27, 2021)

"This retail-driven short squeeze is kind of taking these exaggerated moves to new levels that I have never seen before. It is sort of remarkable," said Eric Kuby, chief investment officer at North Star Investment Management in Chicago. But, he said, "this is something that is not going to continue much longer because it is completely decoupled from any kind of economic reality."[29]

Business Insider (January 28, 2021)

Day traders, organizing their efforts on Reddit and alternative platform Discord, also drove up the prices of heavily-shorted stocks such as cinema chain AMC, hammering short-sellers.[30]

Dow Jones Institutional News (January 28, 2021)

"This is the worst kind of market manipulation," said John Chachas, a veteran Wall Street deal-maker who leads Methuselah Advisors, a boutique investment banking and financial advisory firm. "People are buying and selling shares of GameStop at absurd prices largely engineered by a short squeeze and the buyers are being fleeced, in my opinion."[31]

Dow Jones Institutional News (January 28, 2021)

This month the stock moved into the pure speculative phase, producing several daily jumps of 50% or more, and fundamentals were abandoned. Many cheerleaders on r/WSB stopped even making the pretense of arguments about Mr. Cohen's chances of turning the company around. Instead, there were two justifications for buying: wanting to get in on the price action to avoid being ridiculed as someone who missed gigantic profits, and the

[28] "'Dumb Money' Is on GameStop, and It's Beating Wall Street at Its Own Game," *NYTimes.com Feed*, January 27, 2021.
[29] "LIVE MARKETS-What Does the Trading Frenzy Mean for Broader Markets?" *Reuters News*, January 27, 2021.
[30] "GameStop Plunges as Much as 60% After Robinhood Curbs Trading on Wildly Volatile Morning," *Business Insider*, January 28, 2021.
[31] "GameStop Surge Tests Scope of SEC's Manipulation Rules," *Dow Jones Institutional News*, January 28, 2021.

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self-fulfilling prospect of hurting the large numbers of short sellers. … Bubbles also frequently have support from technical factors that prevent the asset from being priced correctly. … In GameStop, there are plenty of short sellers, but they are making things even worse. The stock is caught in a vicious short squeeze. Short sellers had borrowed and sold more than 100% of the stock outstanding, as some was borrowed again. As the price rose, at least some of the hedge funds bought back shares to prevent further losses, so pushing the price up even further.[32]

U-Wire (January 28, 2021)

BlackBerry Ltd (NYSE:) jumped 24%, to above $23, Koss Corporation (NASDAQ:) jumped 222%, to $32.25, and Express Inc (NYSE:) rose 247%, to $10.57, all seemingly part of a short squeeze pitting professional and retail traders against each other. The amateur investors, if they decide to sell before stock prices drop for the companies including Koss, could walk away with a pretty penny. "Eventually, it may trend down to the fundamentals of what a stock like this is willing to accept."[33]

Barron's (January 29, 2021)

So far this week, stocks of companies including GameStop (ticker: GME), AMC Entertainment (AMC), Nokia (NOK), Express (EXPR), and American Airlines (AAL) have been swinging wildly, driven in part by individual investors organizing on online message boards. Individuals who successfully traded the swings have reported sizable gains, and the volatility has put pressure on hedge-fund managers who were betting on declines in those stocks with short positions.[34]

Daily Herald (January 29, 2021)

The short squeeze has set off a search for other companies that might be similarly vulnerable, with Express, Bed Bath & Beyond and AMC Entertainment among stocks surging Wednesday.[35]

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[32] "GameStop Shows Epitome of Bubble -- WSJ," *Dow Jones Institutional News*, January 28, 2021.
[33] "In Duel with Small Investors Over GameStop, Big Funds Blink," *U-Wire*, January 28, 2021.
[34] "Wall Street Suggests Ways for American Airlines and Others to Cash In on Squeeze. Investors Should Be Wary.," *Barron's Online*, January 29, 2021.
[35] "GameStop's Steep Stock Rally Lives Another Day as Shorts Give Up," *Daily Herald*, January 29, 2021.

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Dow Jones Institutional News (January 29, 2021)

AMC stock has rocketed 525.5% so far this year amid a market-wide short squeeze.[36]

Dow Jones Institutional News (January 29, 2021)

The saga unfolding surround GameStop, AMC, and other stocks has largely been driven by activity on social media. Investors on Reddit have driven the price of these companies' shares higher in recent weeks in an effort to squeeze hedge funds that had bet on these companies' struggles.[37]

MarketWatch (January 29, 2021)

AMC, Koss and Express stocks were at the top of the biggest gainers list on Wednesday, in sympathy with another GameStop rocket ride. The dynamic that has seemingly contributed to a short squeeze in the stock of videogame retailer GameStop Corp. also appears to be affecting shares in a host of other heavily shorted companies.[38]

Milwaukee Business Journal (January 29, 2021)

Koss Corp. found itself at the apex of what's being called a "short squeeze" in the stock market this week. Individual day traders snapped up downtrodden stocks with significant holdings by short sellers who anticipated making money when stocks like Koss went lower.[39]

New York Times (January 29, 2021)

GameStop started the week as a curiosity — an illustration of how markets may have become detached from reality and how small traders can use options to drive stock prices. By Tuesday, the story of the stock had become an obsession, as it nearly doubled in price. Groups of renegade

[36] "Major AMC Shareholder Silver Lake Sells Entire Stake for $713 Million -- Barrons.com," *Dow Jones Institutional News*, January 29, 2021.
[37] "Read This Before You Try to Grab a Slice of GameStop's Epic Ride -- Barrons.com," *Dow Jones Institutional News*, January 29, 2021.
[38] "It Isn't Just GameStop: Here Are Some of the Other Heavily Shorted Stocks Shooting Higher," *MarketWatch*, January 29, 2021.
[39] "Michael Koss and His Company Should Sell Shares While They're High, Experts Say," *Milwaukee Business Journal*, January 29, 2021.

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investors on forums such as Reddit and Discord were trying to force a short squeeze — pushing up the price of stocks that hedge funds had bet would go down.[40]

Ottawa Citizen (January 29, 2021)

WallStreetBets like to target small stocks where they'll have a bigger impact; that's why you're not seeing any WallStreetBets buzz on major short-sold stocks such as Apple or Intel. In all this, Koss is perfect: It's a '50s-era headphone company being utterly buried in a diversified home electronics market, and with annual sales of only about $20 million, it's exquisitely small. Their stock price went up 500 per cent on Wednesday.[41]

Postmedia Breaking News (January 29, 2021)

Worries of a short squeeze grew after an army of retail investors returned to trade shares in GameStop Corp and Koss Corp. The stocks sky-rocketed after brokers including Robinhood eased some of the restrictions they had placed on trading.[42]

TVNewsCheck (January 29, 2021)

Wall Street's focus remains squarely on GameStop and other moonshot stocks. AMC Entertainment jumped 53.7%, and headphone company Koss vaulted 52.5%. After their success with GameStop, traders have been looking for other downtrodden stocks in the market where hedge funds and other Wall Street firms are betting on price drops. By rallying together into these stocks, they are triggering something called a "short squeeze." In that, a stock's price can explode higher as investors who had bet on price declines scramble to get out of their trades.[43]

BusinessDesk (January 30, 2021)

Several other companies, including AMC Entertainment, Bed Bath & Beyond, National Beverage, BlackBerry, Koss Corporation and Express Inc, also experienced huge share price

[40] "Here's Everything That Happened with GameStop This Week," *NYTimes.com Feed*, January 29, 2021.
[41] "Gamestonk II: What's the Sequel for WallStreetBets?" *Ottawa Citizen*, January 29, 2021.
[42] "Wall St Falls After J&J Vaccine Data; GameStop Effect Weighs," *Postmedia Breaking News*, January 29, 2021.
[43] "Dow Tumbles 621, Nasdaq Slides 266," *TVNewsCheck*, January 29, 2021.

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increases as social media encouraged investors to short squeeze the hedge funds that had large short positions in these stocks.[44]

Business Insider (January 30, 2021)

Members of Wall Street Bets — a retail-investing subreddit — have led the charge in driving GameStop shares up as much as 2,000% this month. They have also worked in concert to spike the stock prices of AMC, BlackBerry, Bed Bath & Beyond, and other heavily shorted stocks. Their goal is to score quick profits and squeeze short-sellers into covering their positions, sending the stocks even higher.[45]

Investor's Business Daily (January 30, 2021)

The GameStop saga is likely far from over. GME stock, AMC Entertainment, Koss, Express and other short-squeeze plans had another mammoth week of ultra-volatile swings.[46]

Investor's Business Daily (January 31, 2021)

On Thursday [January 28], GME stock plunged 77% in less than 90 minutes from its intraday high to low. In a game of musical chairs, you don't want to be the one left standing. When the squeeze plays finally end, GME stock, AMC stock and others will likely come under enormous pressure.[47]

Dow Jones Institutional News (February 1, 2021)

[44] "GameStop, Social Media and Momentum Investing," *BusinessDesk*, January 30, 2021.
[45] "Meet the GameStop Investor Upending the Stock Market with Cat Memes, Reaction GIFs, and Fundamental Analysis," *Business Insider*, January 30, 2021.
[46] "Dow Jones Futures: What's Next For Stock Market Rally — And What Should You Do? GME Stock, Nio In Focus," *Investor's Business Daily*, January 30, 2021.
[47] "Dow Jones Futures: What's Next For Stock Market Rally — And What Should You Do? GME Stock, Nio In Focus," *Investor's Business Daily*, January 31, 2021.

Exhibit 14
Selected Press Commentary on Potential Short Squeeze and Coordinated Short Squeeze Attempts
January 21, 2021 – February 4, 2021

One important factor gave way to any bullish sentiment: short squeezes appear, for now, to be dormant. GameStop (GME) and Bed Bath & Beyond (BBBY) fell 31% and 14%, respectively. AMC Entertainment (AMC) stock rose just 1%.[48]

Investing.com (February 1, 2021)

Last week's short squeeze still appears to have some juice left in it: GameStop (NYSE:GME) stock was indicated up 5.4% in premarket, while AMC Entertainment (NYSE:AMC) stock was up 22%. Koss (NASDAQ:KOSS) stock was up 7.8% and Bed Bath & Beyond Inc (NASDAQ:BBBY) stock up 6.7%.[49]

Barron's (February 2, 2021)

To bet against a company, bears borrow stock, intending to buy it back later at a lower price. Short squeezes occur when a stock's price rises, prompting bears to throw in the towel and buy the stock immediately to limit their losses. That can force other shorts to do the same, and the stock rapidly rises. That's how GameStop stock rocketed to $483 recently from just over $17 at the start of 2021.[50]

Barron's (February 2, 2021)

What goes up, must come down, and today gravity seems to be taking its toll on consumer-related stocks caught up in the short-squeeze frenzy. GameStop (ticker: GME) stock is the biggest mover this morning, down 49%. AMC Entertainment Holdings (AMC) is tumbling 38.2%, Express (EXPR) is 32% lower, Bed Bath & Beyond (BBBY) is off 14.5%, Stitch Fix (SFIX) is 5.5% lower, and Macy's (M) is down 3.6%.[51]

Dow Jones Institutional News (February 2, 2021)

[48] "The Dow Rose 229 Points Because Everything Went Right for Stocks -- Barrons.com," *Dow Jones Institutional News*, February 1, 2021.
[49] "Silver Squeeze, Exxon, Chevron Merger Talk, China PMI – What's Up in Markets," *Investing.com*, February 1, 2021.
[50] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.
[51] "The Short Squeeze Is Now a Retail Rout," *Barron's Online*, February 2, 2021.

Exhibit 14
Selected Press Commentary on Potential Short Squeeze and Coordinated Short Squeeze Attempts
January 21, 2021 – February 4, 2021

Shares of rival chain AMC Entertainment, which had been targeted by Reddit-inspired day traders for a short squeeze, tumbled.[52]

Investor's Business Daily (February 2, 2021)

GameStop, AMC Entertainment and other heavily shorted stocks targeted in a Reddit online forum continued to have huge volume as the short-squeeze trade appears to unwind. [On February 2] GameStop shares plummeted 60% in 76.4 million shares traded, while AMC plunged 41% in 455 million shares.[53]

Milwaukee Business Journal (February 3, 2021)

The "crazy price swings" for Koss and other short-squeeze stocks, including GameStop and AMC Entertainment, are likely to continue for a while, said Ross Mayfield, investment strategy analyst for Milwaukee-based Robert W. Baird & Co. "Over the long term, they'll probably trend back toward historic prices," said Mayfield, who works at Baird's Louisville, Kentucky, office. "It might take months for the full effect to wear off." In other words, stocks like Koss likely won't follow "a straight line back to where they came from," Mayfield said. Mayfield said he's been tracking message boards and Reddit groups that are driving much of the targeted rally and they're not going away. "There's still quite a bit of fervor and enthusiasm," he said. "They're saying things like 'Hold the line' and 'Don't sell.'"[54]

Barron's Online (February 4, 2021)

In recent weeks a number of small investors, coordinating on social media, piled into heavily shorted companies, pushing the stocks up to dizzying levels. … That's been the case for Tootsie Roll: With more than 45% of its shares available for trading, or float, sold short, it was a prime candidate for the squeeze. It began the year trading at less than $30 before shooting up to nearly $59 at the height of the frenzy in late January. Yet on Wednesday, it had given up nearly all

[52] "Communications Services Boosted By Cyclical Demand -- Communications Services Roundup," *Dow Jones Institutional News*, February 2, 2021.
[53] "Stocks Extend Rebound As Market Risk Suddenly Eases; 3 Reasons For Caution," *Investor's Business Daily*, February 2, 2021.
[54] "'Crazy' Price Swings: Koss Stock Bounces Back 28%," *Milwaukee Business Journal Online*, February 3, 2021.

Exhibit 14
Selected Press Commentary on Potential Short Squeeze and Coordinated Short Squeeze Attempts
January 21, 2021 – February 4, 2021

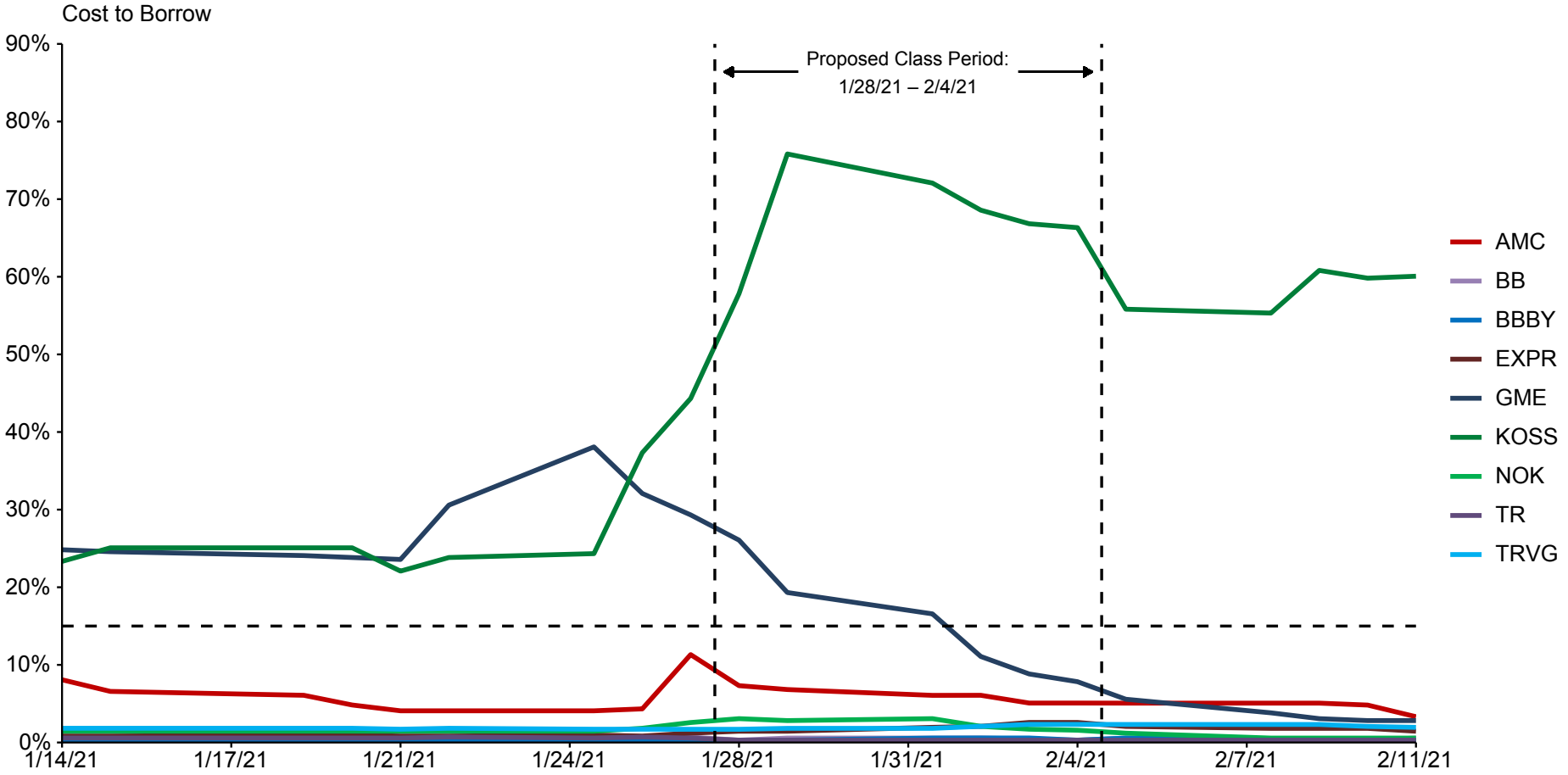
those gains, trading up 3.3% to $32.03. It's still up almost 8% year to date, although it's fallen 3.5% in the past 12 months.[55]

Dow Jones Institutional News (February 4, 2021)

Individual investors became wonderfully engaged with stock picking as 2021 began. Unfortunately, many were buying stocks that had been flagged on social media as ripe for a short squeeze. There's nothing necessarily wrong with pushing up a stock to panic shortsellers into joining the buying frenzy -- but by the end of January, many of the companies targeted by squeeze campaigns had soared to valuations far out of line with analysts' forecasts for their businesses. Traders who were still buying seemed oblivious to fundamental analysis. And in the end, sales and earnings matter. At its January 28 peak of $483, GameStop (ticker: GME) stock was valuing the company above $33 billion, even though analysts predict losses for the next few years as it shutters hundreds of its videogame retailing locations.[56]

[55] "Tootsie Roll Takes a Wild Ride With Short Squeeze. The Stock Has Given Up Most of Its Gains This Year." *Barron's Online*, February 4, 2021.
[56] "Does Valuation Matter in a Short Squeeze? -- Barrons.com," *Dow Jones Institutional News*, February 4, 2021.

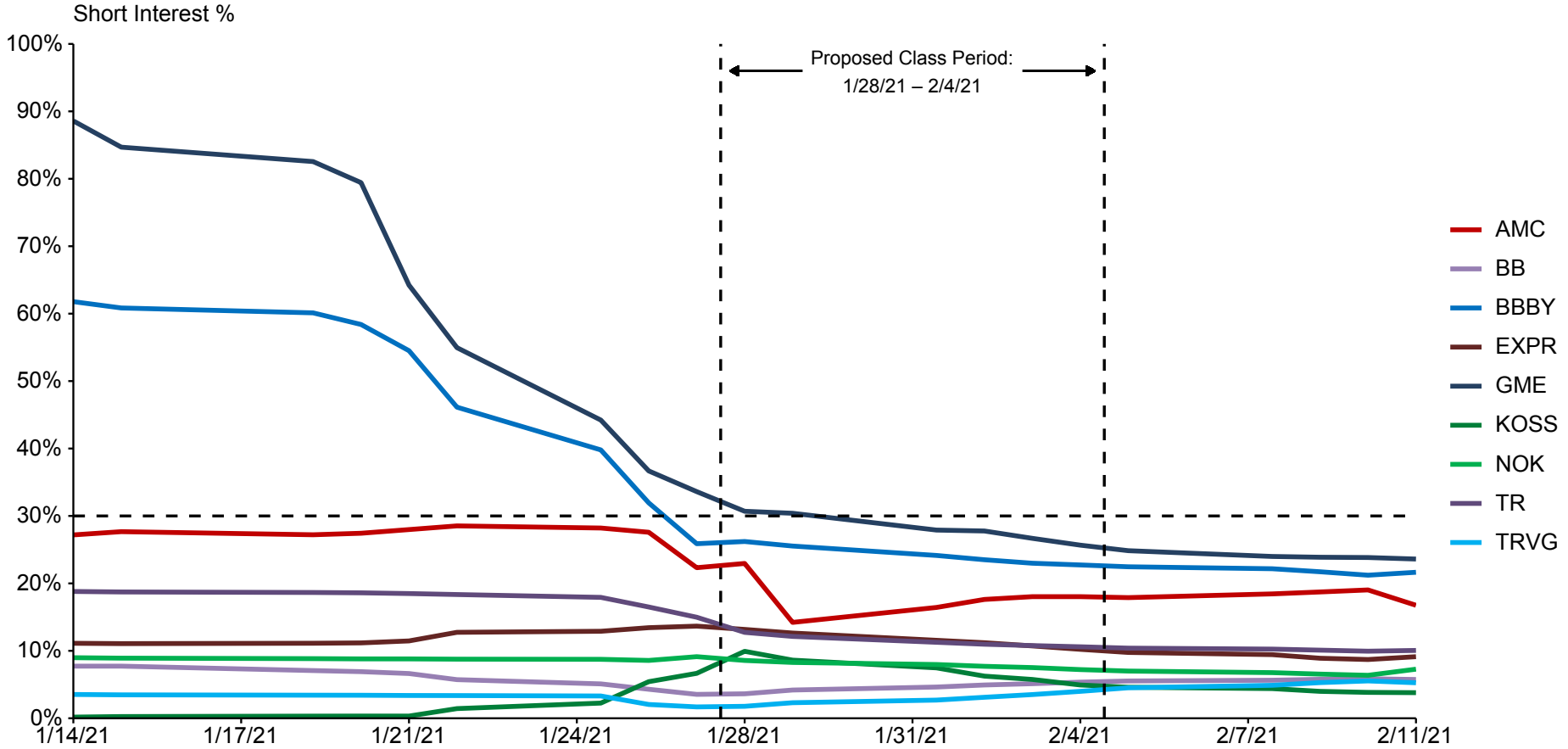
Exhibit 15
Cost to Borrow by Short Sellers
1/14/21 – 2/11/21



Source: S3 Partners; Complaint dated 1/17/23; D. Muravyev, N. D. Pearson, and J. M. Pollet (2022), "Is There a Risk Premium in the Stock Lending Market? Evidence from Equity Options," *The Journal of Finance* , 77(3), pp. 1787–1828 ("Muravyev et al. (2022)") at p. 1802

Note: Cost to borrow reflects the "Offer Rate" variable from S3 Partners, which represents the weighted-average borrowing rate paid by short sellers for all existing short positions. The date is adjusted for each observation by two trading days to reflect the difference between trading date and settlement date. Muravyev et al. (2022) analyze a large sample of U.S. equities that had exchange-traded options over the period from July 2006 to August 2015 and find that the 99th percentile of borrowing costs was 15.0%.

Exhibit 16
Short Interest as a Percentage of Shares Outstanding
1/14/21 – 2/11/21



Source: S3 Partners; *CRSP* ; Complaint dated 1/17/23; D. Muravyev, N. D. Pearson, and J. M. Pollet (2022), "Is There a Risk Premium in the Stock Lending Market? Evidence from Equity Options," *The Journal of Finance* , 77(3), pp. 1787–1828 ("Muravyev et al. (2022)") at p. 1802

Note: The short interest percentage is calculated as the short interest reported by S3 Partners expressed in number of shares divided by shares outstanding obtained from CRSP, including for AMC. AMC issued shares prior to the proposed Class Period which are reported on a delayed basis in CRSP. The date is adjusted for each short interest observation by two trading days to reflect the difference between trading date and settlement date. Muravyev et al. (2022) analyze a large sample of U.S. equities that had exchange-traded options over the period from July 2006 to August 2015 and find that the 99th percentile of short interest was 30.5%.

Exhibit 17

Robinhood Customer Volume as Percentage of Total Volume[1]

1/21/21 – 2/4/21

Prior to Proposed Class Period

Date	AMC		BBBY		BB		EXPR		GME		KOSS		NOK		TRVG		TR		Average Across At-Issue Stocks[2]	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
1/21/21	5.8%	7.3%	1.1%	1.2%	2.3%	1.9%	2.3%	3.8%	3.5%	3.2%	12.9%	8.1%	1.3%	1.0%	0.7%	2.2%	1.0%	0.3%		
1/22/21	5.5%	6.4%	0.6%	0.6%	2.7%	2.0%	4.5%	4.0%	4.4%	4.1%	12.4%	15.9%	1.1%	0.8%	1.6%	1.9%	0.6%	0.3%		
1/25/21	5.3%	4.0%	1.0%	0.9%	3.4%	2.0%	2.9%	2.8%	6.4%	5.0%	5.6%	4.6%	2.4%	0.8%	2.9%	2.3%	0.7%	0.7%		
1/26/21	6.3%	4.8%	1.2%	1.1%	3.1%	2.2%	4.7%	4.6%	6.2%	6.8%	4.1%	3.6%	3.0%	1.6%	2.5%	0.7%	0.3%	0.2%		
1/27/21	7.0%	5.2%	1.7%	1.4%	5.2%	3.7%	5.9%	5.1%	6.1%	5.5%	7.0%	6.7%	8.1%	3.8%	8.0%	6.0%	0.7%	0.4%		
Percentage of Total Volume[3] 1/21/21 – 1/27/21	**6.3%**	**5.1%**	**1.2%**	**1.1%**	**3.8%**	**2.6%**	**4.3%**	**3.9%**	**5.5%**	**5.1%**	**5.4%**	**4.9%**	**6.0%**	**2.8%**	**7.5%**	**5.7%**	**0.7%**	**0.4%**	**4.5%**	**3.5%**
Net Buy (Sell)[4] 1/21/21 – 1/27/21	**1.3%**		**0.2%**		**1.2%**		**0.4%**		**0.4%**		**0.5%**		**3.2%**		**1.9%**		**0.3%**		**1.0%**	

Proposed Class Period

Date	AMC		BBBY		BB		EXPR		GME		KOSS		NOK		TRVG		TR		Average Across At-Issue Stocks[2]	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
1/28/21	0.3%	3.5%	0.0%	0.5%	0.1%	3.0%	0.1%	2.8%	0.1%	2.6%	0.0%	2.3%	0.6%	2.9%	0.3%	3.5%	0.7%	0.9%		
1/29/21	2.4%	1.2%	0.6%	0.3%	2.0%	1.6%	1.6%	1.3%	1.4%	1.0%	1.2%	0.9%	2.3%	1.7%	3.6%	1.9%	0.9%	0.6%		
2/1/21	1.3%	1.4%	1.7%	1.3%	2.5%	2.0%	1.2%	2.1%	1.1%	1.7%	0.8%	0.8%	4.9%	2.3%	4.9%	3.4%	0.4%	0.6%		
2/2/21	2.6%	2.2%	0.7%	1.0%	1.6%	3.2%	2.6%	2.8%	2.4%	2.3%	2.8%	2.2%	2.1%	4.2%	3.0%	4.6%	0.3%	0.6%		
2/3/21	3.7%	2.9%	2.0%	1.9%	1.9%	2.2%	5.6%	4.8%	2.6%	2.5%	5.2%	4.3%	4.7%	4.0%	2.5%	3.1%	0.6%	0.7%		
2/4/21	4.4%	5.0%	0.6%	1.2%	1.7%	3.3%	6.8%	6.0%	2.6%	4.0%	6.2%	5.5%	3.5%	4.6%	5.0%	3.2%	0.5%	0.8%		
Percentage of Total Volume[5] 1/28/21 – 2/4/21	**2.0%**	**2.4%**	**0.6%**	**0.8%**	**1.3%**	**2.6%**	**1.7%**	**2.6%**	**1.8%**	**2.4%**	**2.0%**	**2.2%**	**2.1%**	**2.9%**	**2.7%**	**3.2%**	**0.6%**	**0.7%**	**1.6%**	**2.2%**
Net Buy (Sell)[6] 1/28/21 – 2/4/21	**(0.4%)**		**(0.2%)**		**(1.3%)**		**(0.9%)**		**(0.7%)**		**(0.2%)**		**(0.8%)**		**(0.5%)**		**(0.1%)**		**(0.6%)**	

Source: *CRSP*; Robinhood Equity Volume Data

Note:
[1] Percentage of Total Volume is calculated as the execution quantity on Robinhood divided by the unadjusted total trading volume from CRSP.
[2] Average Across At-Issue Stocks for both Percentage of Total Volume and Net Buy (Sell) is calculated as the simple average of the values for the nine At-Issue Stocks.
[3] Percentage of Total Volume prior to the proposed Class Period is calculated as the total execution quantity on Robinhood from 1/21/21 to 1/27/21 divided by the unadjusted total trading volume from CRSP from 1/21/21 to 1/27/21.
[4] Net Buy (Sell) Prior to Proposed Class Period is calculated as the percentage of total buy volume from 1/21/21 to 1/27/21 minus the percentage of total sell volume from 1/21/21 to 1/27/21. This value will be positive when the buy volume is greater than the sell volume, and negative when the sell volume is greater than the buy volume.
[5] Percentage of Total Volume during the proposed Class Period is calculated as the total execution quantity on Robinhood from 1/28/21 to 2/4/21 divided by the unadjusted total trading volume from CRSP from 1/28/21 to 2/4/21.
[6] Net Buy (Sell) During the Proposed Class Period is calculated as the percentage of total buy volume from 1/28/21 to 2/4/21 minus the percentage of total sell volume from 1/28/21 to 2/4/21. This value will be positive when the buy volume is greater than the sell volume, and negative when the sell volume is greater than the buy volume.