Contagious crime:
How cryptocurrency manipulation spills into stocks [*]

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Abstract

We show that a type of market manipulation popularized in cryptocurrency markets is now also found in stock markets, an effect we term "crime contagion". Manipulators co-ordinate pump-and-dump attacks on stocks using pseudo-anonymous online forums (e.g., Telegram), exploiting scheme participants. We find such manipulations in Australia, India, and the US during 2020–2022. They generate millions of dollars of trading and returns of 26%–107%. We find direct regulatory intervention in forums is effective in curbing this activity. The findings illustrate a negative externality of unregulated markets: breeding misconduct that spills into other markets.

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1. Introduction

Imagine sitting in an auditorium with 10,000 other people and on the stage is Jordan Belfort of Wolf of Wall Street fame.[1] Belfort names a stock and tells everyone to open their mobile phone and buy it immediately. Some do, many do not. Ten minutes later, Belfort informs the audience that the stock's price has risen by 5%. There is a buzz around the room now as the people who bought earlier are thinking about selling, while the ones who did not buy earlier are considering buying. Belfort interjects, "Hold on guys, we can push this stock's price up much further". Replace Jordan Belfort with an anonymous manipulator and the auditorium with an online chat group in this hypothetical scenario and you begin to get a sense of how market manipulation operates on today's social media platforms.

Such market manipulation, orchestrated via public social media platforms, became popular in cryptocurrencies since 2018.[2] It differs from traditional stock market pump-and-dump in that the manipulator usually does not try to trick others into thinking a stock is underpriced, but instead openly declares in social media their intentions to pump. This feature is distinctively different to the typical use of deception in other types of market manipulation (e.g., Putniņš, 2020). Although the element of deceit may not be present in these schemes, these schemes are nevertheless exploitative of less informed and less sophisticated participants, warranting the concerns of policymakers (Dhawan and Putniņš, 2023). The schemes result in substantial wealth transfers between participants, raising questions of fairness and harming the integrity of markets.

We document a spread of this transparent form of pump-and-dump manipulation from cryptocurrency markets where it was conceived and popularized, to stock markets.[3] We identify such manipulation in five of the largest stock exchanges in the world including the Australian Securities Exchange (ASX) in Australia, the Bombay Stock Exchange (NSE) and National Stock Exchange (NSE) in India, and NASDAQ and the New York Stock Exchange (NYSE) in the United States.[4] We combine information from securities regulators in all three countries with

[1] In this hypothetical example, we are referring to Leonardo DiCaprio's character in the movie 'The Wolf of Wall Street' and not the real person.
[2] For example, see Dhawan and Putniņš (2023) and Li, Shin, and Wang (2023).
[3] Pump-and-dump manipulation involves manipulators taking a long position in a security, then artificially inflating the price of the security by spreading false information (the "pump"), and selling their positions at inflated prices (the "dump"). This form of manipulation is known as information-based pump-and-dump manipulation.
[4] One of the two NYSE pumps occurs on NYSE American. We consider NYSE American as part of NYSE for the purpose of our study. Similar manipulation activity was also observed in Hong Kong; however, we do not include Hong Kong in our sample since the regulators have not released any details about the individual manipulation cases.

hand-collected data from online groups to form a sample of 37 pump-and-dump manipulation cases. These pumps occur between September 2020 and April 2022 and affect 31 stocks. This form of manipulation caught on quickly (as it did in cryptocurrencies earlier), with as many as 263,000 individuals participating in these stock market pumps.

These pumps are conducted on private chat groups on the social media platforms Telegram and Discord. The pseudo-anonymity of these platforms mirrors that of cryptocurrencies and is a key enabler of this "transparent" form of market manipulation. Manipulators share the name of the pumped stock with their followers either through an explicit "pump signal" (Australia) or a more innocuous sounding "stock recommendation" (India and US) that has the same effect.[5] Australian manipulators candidly state that they intend to pump stocks and ask their followers to join. Such highly explicit open claims about pumping a security are the hallmark of how these manipulations occur in cryptocurrencies (e.g., Dhawan and Putniņš, 2023). In our sample of US and Indian manipulators, they try to convince their followers to follow their recommendations often by flaunting their wealth.

There are similarities that suggest these pump-and-dump manipulations of stocks are a spillover from the schemes that have become widespread in cryptocurrency markets (Dhawan and Putniņš, 2023). In addition to using the same online venues (Telegram and Discord channels) and relying on pseudo-anonymity, manipulators in both settings do not release any false information about the stock or coin, in contrast to traditional information-based pump-and-dump manipulation. Rather, they directly or indirectly urge followers to push up the prices of the stock or coin.[6] Further, analysis of examples of the posts made in Telegram and Discord channels indicate very similar messaging styles in stock pump groups compared to earlier messages found in cryptocurrency pump groups (e.g., Figure 1 of this paper). Our comparison of pump-and-dump activity through time in cryptocurrencies and stocks suggests that pumps have been historically popular in cryptocurrency markets and have recently spilled over into stock markets.

Our results suggest that "what happens in crypto, does not always stay in crypto". An important implication is that unregulated markets impose a negative externality – they can breed misconduct that subsequently spills over into other markets. An analogy is a neighborhood that

[5] Despite claiming to only share stock recommendations, the actions of the American and Indian manipulators do constitute market manipulation. We provide a detailed discussion in Section 2.1.

[6] Section 2.1 explains the techniques that manipulators use to persuade their followers to push up prices through sustained buying pressure.

ceases to have laws or law enforcement. That neighborhood would likely become a harbor for criminals and the heightened criminal activity is likely to spill over and affect neighboring areas. Similarly, countries that had higher infection rates during the pandemic due to less stringent restrictions often resulted in infection spillovers to neighboring countries. Although this crime contagion effect that we document seems intuitive, we are unaware of any prior studies to have documented similar spillovers of crime or misconduct between financial markets, which is one of the contributions of this paper.

For regulators and policymakers, the crime contagion effect adds an additional consideration when delaying regulation and law enforcement in new markets. The consequences of the lack of regulation, or perceived lack of regulation, can extend beyond the new markets and affect existing regulated markets.

Market manipulation distorts asset prices, which are key inputs in investment and financing decisions routinely made by companies and individuals. It also harms market integrity and liquidity (Aggarwal and Wu, 2006; Comerton-Forde and Putniņš, 2014). Manipulation is illegal in all three countries and, therefore, it is not surprising that all three securities regulators initiated swift action against this manipulation activity. The Securities and Exchange Commission (SEC) in the US and the Securities and Exchange Board of India (SEBI) in India followed the standard approach. They traced the manipulators' trading activity and private conversations to establish a strong case against them before taking enforcement action. The Australian Securities and Investments Commission (ASIC) in Australia, on the other hand, did something unusual. ASIC joined a pump-and-dump group and, at the beginning of a pump, sent messages informing the group members that the pumps being conducted on the group are illegal and that they can use trading records to identify and punish the participants. ASIC's decision to join a pump group and directly warn the manipulators and their potential victims is an unprecedented step – it constitutes a form of active regulation that is not common in securities markets.

We examine the effectiveness of ASIC's intervention. We find that the pump-and-dump groups that existed pre-intervention have either disappeared or become inactive and no new groups have emerged. Secondly, the results of difference-in-differences tests suggest that the volatility of pumped stocks and stocks that are vulnerable to manipulation reduces after ASIC's intervention. These results provide strong evidence to suggest that ASIC's intervention worked.

The reduction in volatility of vulnerable stocks post-intervention is an important finding since it implies that pumps have not simply moved to other stocks or other forums after the intervention, rather the overall manipulation activity has in fact gone down.

We conjecture that ASIC's intervention succeeds because it prevents the group participants, especially the non-manipulators, from participating in these schemes. The Telegram and Discord group members users participating in these pump-and-dump schemes might liken them to similar schemes in cryptocurrency markets, where their legal position is murky, and assume these schemes are not illegal even in stock markets. Klimczak et al. (2022) argue that financial crime is generally a positive net present value (NPV) proposition *ex-ante* after accounting for the likelihood of discovery and potential financial penalties. Given the low perceived costs of participation, since many would either not realize that these schemes are illegal or assume that the brunt of the punishment will be faced by the manipulators, the group participants might view these schemes as a positive NPV proposition since they expect to earn profits from participation due to their biases such as overconfidence and gambling preferences.

Through their intervention, ASIC, a credible authority, directly addresses the users of the group and makes it clear that the activities conducted on the group are illegal. This intervention potentially activates the intrinsic motivation in group participants to not participate in illegal activities, or at least informs them that they are being surveilled and activates the intrinsic motivation to not perform illegal activities while being watched, and thus precludes them from participating even though they might still view this activity as having a positive NPV (Klimczak et al., 2022). In Section 5.2, we provide a discussion about this unique regulatory intervention, outlining the potential reasons for its success, identifying scenarios in which such interventions are likely to be the most effective, and discussing some potential downsides.

We document various empirical facts about this transparent pump-and-dump manipulation in stocks. First, based on a combination of estimations and actual profit figures, we find that the manipulators earned upwards of $19 million from these manipulations. These estimates likely understate the full extent of this type of manipulation in stock markets. As a lower bound, they illustrate non-negligible spillovers of misconduct from cryptocurrency markets.

In terms of impacts on the market, these pumps are like sharp, short-term bubbles. Australian (Indian) pumps are the fastest (slowest), with the average pump reaching its peak in

about 6 (10) hours and prices rising by about 84% (26%) in this period. US stock pumps generate the largest price jumps, with prices rising about 107% from start to peak. These price jumps are followed by reversals that are usually more drawn out. While the sample of cases is not necessarily representative of all such manipulations, the impacts demonstrate that at least some of these manipulations have substantial impacts on market prices. In general, however, the speculative activity that forms the core of this type of manipulation is mostly welfare destroying and, unlike certain other types of price speculation, it is not accompanied by the offsetting benefit of faster incorporation of information into prices (Angel and McCabe, 2009; Dhawan and Putniņš, 2023).

Pumps in all three countries lead to extreme price and volume distortions; average start-to-peak returns are 7–13 standard deviations above the pumped stock's average daily return and start-to-peak volumes are 4–33 times the stock's average daily volume. Although these pumps significantly increase the volume and volatility of the pumped stocks in the days around the pump, they leave no permanent impact on prices as the high pump returns are completely reversed within 25 days.

To learn more about this form of manipulation, we examine what motivates participants to trade in these manipulation schemes despite the unusual transparency about the manipulation, Dhawan and Putniņš (2023) find that the followers participate despite negative expected returns because of behavioral biases such as overconfidence and gambling preferences. Since these stock pumps resemble cryptocurrency pumps, a subset of participants might view them purely as speculative games and participate because they either overestimate their ability to profit from these pumps (overconfidence) or value the low probability prospect of earning large profits from these pumps (gambling preferences). Additionally, given their purported research expertise and superior trading performance, some participants might incorrectly believe that the manipulators are informed and join pumps to follow their trades (Allen and Gale, 1992).

Our tests provide some indirect evidence to support both the behavioral biases and trade-based manipulation mechanisms. First, we find that the manipulators target small and low-priced stocks. Such stocks are attractive to retail investors (Barber and Odean, 2000; Kumar, 2009), who are known to exhibit biases such as overconfidence and gambling preferences (Barber and Odean, 2000; Grinblatt and Keloharju, 2009). This result is consistent with the behavioral biases mechanism since manipulators might select these stocks to make pumps more attractive for

behaviorally biased retail investors. Second, the manipulators also target more volatile stocks, i.e., stocks for which there is higher uncertainty about the fundamental value. This result is consistent with trade-based manipulation as in Allen and Gale (1992) since, without uncertainty about the fundamental value, uninformed traders will not follow the manipulators, even if they believe the manipulators to be informed.[7]

Our study contributes to the market manipulation literature. To the best of our knowledge, this is the first study of social media pump-and-dump manipulation in multiple large stock markets across the globe. Dhawan and Putniņš (2023) study similar manipulation schemes in cryptocurrency markets. The popularity of social media platforms and the ease with which manipulators can recruit followers and broadcast messages to a wide audience means that the number of potential victims of this kind of manipulation is very high, substantially higher than alternative channels such as phone calls and word of mouth.

The idea that social media can be used for market manipulation in stock markets is not new. Renault (2011) shows that spikes in suspicious social media activity could be indicative of market manipulation. In contrast, we only focus on directly observable cases of manipulation. Kogan, Moskowitz, and Neissner (2022) find that trading activity in response to legitimate news reduces after previous instances of fraudulent news on social media, while Ullah, Massoud, and Scholnick (2014) document price and volume distortions due to fraudulent news that persist even after the news is discredited by the SEC. The type of manipulation we study differs considerably from the type of manipulation in Renault, Kogan et al., and Ullah et al. All of those studies consider information-based manipulation wherein manipulators spread false information about the stock, a feature that is missing from the cases we study. Behavioral biases and trade-based manipulation are mechanisms that better fit our context.

Further, Sabherwal, Sarkar, and Zhang (2011) document pump-and-dump price patterns following online discussions and in the absence of new fundamental information. However, unlike our paper, in their sample, it is unclear whether the cases constitute market manipulation since they do not establish an intention to manipulate the market, one of the key requirements for establishing manipulation (Putniņš, 2020). Lastly, Jarrow and Li (2021) provide a theoretical

[7] This result is also consistent with information-based manipulation as in Van Bommel (2003). However, as mentioned previously, manipulators typically do not release any false information about the stock, which is required under information-based manipulation.

model of short squeezes coordinated on social media such as the GameStop episode. However, the pumps we study do not appear to attempt to squeeze large short sellers.

Our study also contributes to the literature on securities regulation. We discuss and examine the effectiveness of ASIC's unique method of countering this form of manipulation, joining a pump-and-dump group and directly warning the group members to not participate in the pumps. Our findings suggest the intervention was successful in combating this type of online chat group market manipulation activity, implying that such proactive regulatory interventions can be effective in this new age of social-media-based market manipulation.

2. Data

We identify 37 unique instances of social-media-based pump-and-dump manipulations that are coordinated in Telegram and Discord channels much like cryptocurrency pump groups. The manipulations that we identify affect 31 stocks in three countries. In our sample, 16 stocks are listed on the ASX in Australia, 3 stocks are listed on either BSE or NSE in India, 10 stocks are listed on NASDAQ, and 2 stocks are listed on NYSE in the United States. Our sample period is from September 2020 to April 2022.

We use a variety of sources to construct the sample, including hand-collection from Telegram and Discord channels, which we search for the keywords "pump" and "stock", searches of the news database Factiva, and documents from law enforcement agencies. Our main source for the Australian cases is ASIC's response to a question asked during a parliamentary inquiry.[8] We also add pump-and-dump cases that we hand collect from the chat records of a Telegram pump-and-dump group to the Australian sample, which are missing from ASIC's filing. Our main source for the Indian data is SEBI's enforcement order against the Indian manipulators.[9] Our main source for the US cases is the complaint and indictment lodged by the SEC against the manipulators in the Southern Texas district court.[10] In the American and Indian cases, we also collect the manipulator profit figures reported by the regulators in these documents.

[8] Found at this link https://bit.ly/3kXrnhx
[9] Found at this link http://bit.ly/3Y5ZNNq
[10] The complaint can be found at this link https://bit.ly/3wMIdCa and the indictment can be found at this link https://bit.ly/3JAPv3P

In addition to pumps data, we obtain trades data for all five exchanges from Refinitiv DataScope. We collect market capitalization data from Morningstar DatAnalysis (ASX), Orbis (BSE), the NSE website, and the Center for Research in Security Prices (CRSP) database (NASDAQ and NYSE). Lastly, we obtain short interest data from ASIC's website (ASX) and Compustat (NASDAQ and NYSE).

3. How does social-media-based pump-and-dump manipulation work?

3.1 Background

In the sample of manipulation cases that we identify and analyze, manipulators in all three countries follow a broadly similar modus operandi. They leverage the social media platforms Telegram and Discord to attract and communicate with their followers. In our sample, Australian and Indian manipulators mainly use Telegram, while American manipulators use Discord. Communication in Telegram and Discord primarily occurs in private groups or channels created and run by administrators (in this case, manipulators). These groups are publicly accessible since they can be found and joined by any Telegram or Discord user. Communication on these groups is often one-way, meaning that only the administrators can broadcast messages to group members.

The primary advantage that social media platforms offer manipulators over traditional channels such as word of mouth and phone calls is the ability to easily reach a large potential audience, while remaining pseudo-anonymous. Telegram and Discord have a total of more than 800 million monthly active users between them.[11] Costs of joining and exiting Telegram and Discord groups are minimal, thus enabling manipulation groups to build a large mass of members (i.e., potential readers of the manipulators' messages) fairly easily.

In our sample, Australian manipulators make their intentions to manipulate stocks clear to their followers and actively encourage them to join the manipulation. Their Telegram channels have audacious names such as "ASX Pump and dump Channel" and "ASX Pump Announcement Channel", and, in their communications to their followers, they make no qualms about the fact that the sole purpose of the group is to "pump" Australian stocks (see Panel A in Figure 1 for a sample of messages sent on an Australian Telegram group in the lead up to a pump).

[11] Source: Statista.

The manipulators announce the scheduled date and time for the pump well in advance and only release the name of the stock through a "pump signal" at the time of the pump. Group members typically purchase the stock following the pump signal, thus driving up the stock's price and trading volume (see Section 4.1 for more details). The price typically continues to rise for a few hours after which the trend reverses (due to the manipulation crowd liquidating their positions) and the price falls until it reaches close to its original value.

< Figure 1 >

In our sample, US and Indian manipulators are more circumspect in their approach. They opt for neutral group names such as "Atlas Trading" and "Bull Run Investment Educational Channel". They do not announce pumps ahead of time, and instead directly release the name of the stock, framing it as a "stock recommendation" (see Panel B in Figure 1 for one such example from an Indian manipulation group). As in the example in Figure 1, these recommendations are often accompanied or followed by a price target or other messages suggesting that the manipulators expect the price of the stock to rise rapidly.

Interestingly, the manipulators differ in the tactics they use to convince their group members to follow their recommendations. In our sample, Indian manipulators claim to be research analysts. In contrast, the US manipulators mainly use their wealth rather than their credentials to impress their audience. They do so by showing off their ostentatious purchases, in particular luxury sports cars, and narrating stories about how they managed to convert a small amount of wealth into a very large amount in a relatively short time period through share trading. They also claim that their aim is to help their followers achieve the same feat.[12]

SEC and SEBI trace the manipulators' trading activity around their recommendations and find that they enter into long positions in the stock before sending the recommendation and liquidate their positions soon after sending the recommendation, suggesting that they (like the Australian manipulators) are using their followers to artificially inflate the stock's price and dump their positions on their followers at an inflated price. Private conversations between the American manipulators unearthed by the SEC are even more revealing. They freely discuss how

[12] Examples of tweets made by the American manipulators: "I'll never get sick of pumping.... money into my followers bank accounts. LETS ALL GET RICH!", "I don't want clout. I want my every single one of my followers to be millionaires."

sharing stock recommendations with their followers immediately pushes up the stock's price and enables them to unload their positions at elevated prices. In these chats, they also brazenly admit that they are "robbing" their followers and boast about how they have got market manipulation "down to a science".

The manipulators' intention to inflate stock prices is evident even in their communication with their followers. For example, as in the messages in Figure 1 Panel B, both sets of manipulators often post price updates subsequent to releasing their recommendations, especially if there are sharp price rises (in Figure 1 Panel B, prices rise 5% within three minutes of the recommendation). Such messages serve two purposes. First, they help validate the manipulators' recommendations. Second, these messages can inculcate a "fear of missing out" on potential gains in group members who have not yet bought the stock, thus potentially driving them to buy the stock. The SEC complaint even documents instances wherein the American manipulators directly encourage their followers to squeeze the stock. Hence, despite framing their stock mentions as innocent recommendations, the American and Indian manipulators are as intent as the Australian manipulators to manipulate the market.

3.2 Misconduct contagion

The manipulations in the three countries share similarities with pump-and-dump manipulation in cryptocurrency markets as documented in Dhawan and Putniņš (2023). For example, both sets of manipulators communicate with their followers on private chat groups on Telegram and Discord. The content and format of the messages on these platforms are similar for stock manipulations and earlier cryptocurrency manipulations (see comparisons in Figure 1).

Additionally, in both settings, unlike traditional pump-and-dump manipulation cases, manipulators do not release any false information about the stock or coin. Rather, they name a stock or coin and explicitly or implicitly urge their followers to push up prices of this stock or coin.

Figure 2 displays a time-series plot of weekly pumps in both stock and cryptocurrency markets. It is evident from the graph that pumps have been historically popular in cryptocurrency markets and rapidly gained popularity in stock markets during the COVID-19 lockdown period of 2021, suggesting that social media pump-and-dump manipulation is likely to have spilled over to stocks from cryptocurrency markets. This is an interesting result since contagion in returns

and volatility across markets has been documented previously, but we are the first to document contagion in misconduct. Stocks offer some advantages such as improved liquidity and a wider audience to the manipulators, however, come with the cost of substantially higher regulatory oversight.

< Figure 2 >

4. Empirical characteristics of social-media-based stock pump-and-dumps

In this section, we analyze the impact that pumps have on prices and trading volumes and the characteristics of stocks that are targeted by manipulators.

4.1 Prices and volumes around pumps

Pumps in all three countries in our sample exhibit similar price and volume patterns, with some variation in the duration of pumps. Figure 3 plots average cumulative returns and volumes in the days around the pump for Australian pumps. In our data, we observe a clear dichotomy in the Australian pumps. Some pumps have significantly elevated prices at the end of the first day of the pump relative to the start of the day, while others do not.[13] Conjecturing that this difference in first-day returns might reflect a difference in the duration of the pump, we plot the returns and volumes for both groups separately.

Panel A in Figure 3 plots the returns and volumes from one day before the pump until five days after the pump for pumps with low first-day returns. Prices rise slightly before the start of the pump as manipulators establish their positions (the "pre-pump" phase). Prices rise at a rapid rate immediately after the manipulators release the pump signal at $t = 0$ as their followers purchase the stock (the "pump" phase). The pump reaches its peak within the same trading day. Upon reaching the peak, the "dump" phase commences, and prices fall at a relatively slower rate and return close to their pre-pump level five days later.

The volume graph indicates that there is some trading activity, most likely from the manipulators as they take a long position in the stock, before the signal is sent. After the signal is sent, the graph follows a concave pattern. Initially, there is a steep rise in trading volumes as the followers join the pump and purchase the stock. As we go farther away from the signal and enter

[13] One reason for some pumps to have significantly elevated closing prices could be that their pump signals are released sometime in the middle of the trading day rather than at the beginning. However, we cannot verify whether this conjecture is true since we do not observe exact signal times in our data.

the dump phase, the rate of trading decreases. This pattern resembles the returns graph in that there is a lot of activity during the pump phase while the dump phase is more subdued.

We observe similar return and volume patterns in the remaining Australian pumps (Panel B in Figure 3), the Indian pumps (Figure 4), and the American pumps (Figure 5). One difference in the plots is that, in the American and Indian pumps, pump signals are replaced by stock recommendations. Other than this minor difference, the only difference is in the duration of the pumps. The American pumps are quicker, lasting only three days. The remaining Australian pumps and the Indian pumps are more drawn out, with a total duration of ten days and 25 days respectively and a start-to-peak duration of five days and two days respectively.

< Figure 3 >

< Figure 4 >

< Figure 5 >

Table 1 reports various descriptive statistics that help quantify the impact that pumps have on prices and volumes. We document three interesting observations. First, these pumps are quick. In all three countries, on average, pumps peak within a few hours (between 6–10 hours), a significantly shorter time period than traditional stock pump-and-dumps, which can last for months (Aggarwal and Wu, 2006).

Second, these pumps are impactful. Average start-to-peak returns are high in both absolute and relative terms. From lowest to highest, average pump returns are 26%, 84%, and 107% in India, Australia, and the United States respectively. The short start-to-peak windows mean that these high returns are generated within hours, with much of the pump return being generated right at the market open. We get an even better sense of how extreme these price distortions are when we compare them to the pumped stock's daily returns. Pump returns are 7, 10, and 13 standard deviations above the pumped stock's average daily return in India, Australia, and the United States respectively.

Pumps also lead to extreme volume distortions; the start-to-peak volumes are 4, 11, and 33 times the pumped stock's average daily volume in the United States, Australia, and India respectively. Interestingly, the price and volume distortions in our sample of stock manipulations are much more extreme than those in cryptocurrency markets. Returns in cryptocurrency pumps

are only 4 standard deviations above the pumped coin's average daily return while start-to-peak volumes are only 5 times the coin's average daily volume (Dhawan and Putniņš, 2023). This comparison suggests that the average pump comes as a greater price and volume shock in the stock market than the cryptocurrency market. The high baseline volatility in cryptocurrency markets could be the reason why cryptocurrency pumps have a relatively low impact (Liu and Tsyvinski, 2021).

Lastly, these pumps are quite profitable for the manipulators. SEC and SEBI report the actual profits earned by the manipulators at the pump level in their filings. The manipulator percentage and dollar profit statistics in Table 1 use the actual figures for the American and Indian pumps and estimations for the Australian pumps.

To calculate the manipulators' percentage and dollar profit for the Australian pumps, we assume that the manipulators buy at the volume-weighted average price in the trading day before the pump and sell at the volume-weighted average price from start to peak during the pump. We also assume that their initial investment is equivalent to the "pre-pump" volume, i.e., the volume one day before the pump. We find that the samples of American and Australian pumps are fairly profitable for the manipulators in both percentage and dollar terms. The average American (Australian) pump earns the manipulators a sizeable $1.1 million ($0.24 million), which equates to a 10% (34%) return on their pre-pump investment.

< Table 1 >

Formal tests confirm that pump-and-dumps have a significant effect on prices and trading volumes in the days around the pump. Using stock-day observations for all stocks listed on all five exchanges, we run regressions with trading volumes, returns, and volatility as dependent variables. The main independent variable in these regressions is an indicator variable that equals one if the stock was the target of a pump on the given day. We also add an indicator variable for the day before a pump and daily indicator variables up to three days after the pump as independent variables. We control for the stock's market capitalization, exchange fixed effects, stock fixed effects, and time fixed effects.

Table 2 reports the regression results. We find heightened trading activity in the days surrounding a pump, with trading volumes (in dollars) being the highest on the day of the pump

(Models 1–3). The coefficients for all indicator variables for days around the pump are statistically significant at the 1% level in all regression specifications. Trading volumes are between 30 to 80 times higher on the day of a pump.[14] The effect of pumps on volumes dissipates as we go further away from the day of the pump.

The results also show similar effects of pumps on the pumped stock's intraday volatility measured as the natural log of the difference between the day's high price and low price scaled by the volume-weighted average price (Models 4–6). The coefficients for all days around the pump are statistically significant at the 1% level. Intraday volatility is around 4 to 6 times higher on the day of a pump.[15] There results suggest that pumps have a statistically significant effect on prices and volumes in the days around the pump.

The results of the last dependent variable of interest, i.e., the return from one day before the stock day (day –1) to 25 days after the stock-day (day 25), are reported in Models 7–9. None of the coefficients are significant in any of the specifications. This result implies that the high returns generated during pumps are completely reversed and the prices of pumped stocks return to their initial, pre-pump levels within 25 days of the pump. Pumps do not leave a permanent impact on the prices of pumped stocks.

< Table 2 >

4.2 Which stocks are targeted by manipulators?

Selecting which stock to manipulate is a strategic decision that can depend on a variety of factors such as the intended targets of the manipulation, the profit potential of the stock, the trading activity in the stock, and so on. In this section, we examine whether characteristics such as the stock's market capitalization, price level, volatility, short interest, or liquidity affect the likelihood of it being targeted by manipulators.

We estimate logistic regressions using stock observations with an indicator variable that equals one if the stock has been pumped at least once during the sample period as the dependent variable.

[14] The dependent variable is the natural log of the dollar trading volume. On the day of a pump, trading volume increases between $e^{3.46} = 31.82$ times to $e^{4.43} = 83.93$ times its usual level.

[15] On the day of a pump, volatility for the pumped stock increases between $e^{1.33} = 3.78$ times to $e^{1.76} = 5.81$ times its usual level.

Table 3 reports the results. First, we find that stocks with below median market capitalization (small stocks) are more likely to be manipulated (Model 1). The coefficient is statistically significant and indicates that being a small stock increases the odds of manipulation by 256%.[16] One reason for this could be that small stocks have higher limits to arbitrage and are thus easier to manipulate. The results in Model 2 indicate that manipulators also target stocks with low prices. The odds of being pumped increase by 420% if the stock has a below median market price. One interpretation of this and the previous result is that manipulators might target small stocks with low prices to appeal to retail investors. Retail investors often display behavioral biases such as overconfidence and gambling preferences (Barber and Odean, 2000; Grinblatt and Keloharju, 2009), which are one of the main mechanisms behind these manipulation schemes. Retail investors typically trade in small amounts and are attracted to small stocks and low-priced stocks (Barber and Odean, 2000; Kumar, 2009). One of the reasons manipulators might be selecting such stocks could be to try to attract as many retail investors as possible to their manipulation schemes.

We also examine whether manipulators target more volatile stocks. Model 3 (4) reports the results for intraday volatility (5-day volatility). The coefficients for both variables are highly statistically significant and suggest that the odds of manipulation increase by 15% (18%) for a 1% increase in intraday volatility (5-day volatility). Targeting stocks with high volatility is consistent with another mechanism, i.e., trade-based manipulation as in Allen and Gale (1992). This mechanism requires uncertainty about the fundamental value of a stock. If such uncertainty exists, an uninformed large trader can successfully manipulate the market if other traders attach a positive probability to this trader being informed. Manipulators might be targeting more volatile stocks, i.e., stocks with higher uncertainty about their fundamental value, to maximize the chance that other traders follow their trades in the mistaken belief that they are informed.

Next, we test whether the level of short interest in the stock affects its likelihood of being pumped. These pumps share features with short squeezes coordinated on the Reddit forum r/wallstreetbets, including the famous GameStop episode. In these squeezes, a group of individual investors coordinated their buying activity in certain highly shorted stocks on a social media platform (Reddit) with the intent of squeezing large short sellers such as hedge funds (see

[16] The coefficient is 1.27. This equates to an odds ratio of 3.56 ($e^{1.27} = 3.56$). This implies that when the indicator variable 'Below median market capitalization' takes the value of 1 (for small stocks), the odds of manipulation increase by 256%.

Doran (2021) for details). Like these Reddit squeezes, pumps involve coordinated trading by an online community and display bubble-like price patterns. Hence, we examine whether these pumps fall under the same category.

We do not find this to be the case. The level of short interest in the stock does not have a statistically significant positive relation with its probability of being pumped (Model 5), which is what we would expect if these pumps were coordinated squeezes since squeezes are more likely to target highly shorted stocks to maximize the chance of success.[17]

Finally, we examine liquidity. The role of liquidity in the manipulator's stock selection process can be complex. Manipulators would not want to target stocks that are very illiquid since that would make entering and exiting their positions difficult and thus reduce the chances of success and limit the scale of profits. At the same time, stocks with low liquidity have higher limits to arbitrage and higher price impact parameters (e.g., the λ in Kyle (1985)), which means an increased ability to push prices around, thus increasing the profits that the manipulator can extract from the pump. In line with this reasoning, previous studies find that manipulators target stocks that are neither too illiquid nor highly liquid (Comerton-Forde and Putniņš, 2014; Dhawan and Putniņš, 2023).

We divide stocks into quartiles based on two liquidity measures (number of trades and dollar trading volume) and use indicator variables for the stock's liquidity quartile as independent variables. The results for number of trades (dollar volume) quartiles are reported in Model 6 (7). As per our predictions, we find that, for both measures, the stocks in bottom-most liquidity quartile, i.e., the most illiquid stocks, and stocks in the top-most quartile, i.e., the most liquid stocks, are less likely to be manipulated than stocks in the middle two quartiles. Within the middle two quartiles, stocks in the second lowest liquidity quartile are more likely to be manipulated than stocks in the third lowest quartile based on both statistical and economic significance of the coefficients for both measures. These results suggest that manipulators target stocks that lie in the middle of the liquidity spectrum.

[17] We exclude India from the short interest tests. We do so because the type of short selling behavior that is targeted in the Reddit squeezes is unlikely to arise in India since, based on the Indian short selling rules, open short positions are mandatorily liquidated at the end of a trading day. The hedge funds targeted in the Reddit cases usually take short positions to place long-term bets against the stock. Placing a long-term bet by taking a short position in an Indian stock would be very costly since this position would have to be re-established daily. Institutions typically use derivative instruments if they want to take long-term short positions in Indian stocks.

< Table 3 >

5. Regulation of social media pump-and-dumps

5.1 ASIC's unique intervention

Market manipulation harms market integrity, liquidity, and efficiency (Aggarwal and Wu, 2006; Comerton-Forde and Putniņš, 2011). Therefore, it is no surprise that the securities regulators in all three countries acted swiftly to combat this manipulation activity. While the SEC and SEBI followed the conventional path of conducting a thorough investigation and taking enforcement action once they collected solid evidence against the culprits, ASIC took a rather unconventional route. ASIC joined a pump-and-dump group and, right at the onset of a pump, sent a warning to the group administrators and members stating that intentionally manipulating the market is illegal and that ASIC can use their trading activity to identify and investigate them – see Figure 6.

< Figure 6 >

This step by ASIC is a form of active intervention that is to the best of our knowledge unprecedented in securities markets, and closely resembles criminal law enforcement scenarios wherein the police try to enter the scene of an ongoing crime (in this case, the chat group) and try their best to minimize the damage caused by the crime.

Is such active intervention in social media platforms effective? While we effectively have only a case study to consider, some of the observations that can be made are at least somewhat informative about the potential for such regulatory strategies. Prior to ASIC's intervention on October 11, 2021, we were able to identify at least five dedicated ASX pump-and-dump Telegram groups which conducted at least 16 pumps in total. In the aftermath of the intervention, in due course, these groups disappeared and did not reappear. For example, we conducted a search on Telegram and Discord using various relevant search terms and found that all but two of the original pump groups had been closed and deleted their accounts.[18] The remaining two are inactive – there has been no pump-and-dump activity conducted in either group since the

[18] The search terms include: "ASX pump", "ASX pump and dump", "Australian pump", "Australian pump and dump", "ASX pump announcement", "ASX pump signal".

intervention and the recent conversations on both groups mostly revolve around general topics, including the manipulators trying to reassure themselves that they are not going to go to jail.[19]

The effectiveness of ASIC's intervention is also evident in the differences in pump and market metrics before and after the intervention. For example, the two pumps conducted after the intervention were much less successful, generating an average return of 47%, which is considerably lower than the pre-intervention average pump return of 89%.[20] The post-intervention figure is also worse in relative terms. The post-intervention average pump return is only three standard deviations above the stock's average daily return, compared to the average figure of 11 for the same metric before the intervention. Pumps with low returns are less lucrative for the manipulators and their followers alike (Dhawan and Putniņš, 2023).

To formally test the effects of ASIC's intervention, we use difference-in-differences models to compare the changes in intraday volatility and 5-day volatility after the intervention for stocks that might be affected by ASIC's intervention with that of other stocks.[21] Two categories of stocks might be affected by ASIC's intervention. The first category includes stocks that have actually been pumped, i.e., pumped stocks. The second category includes a broader set of stocks that are prone to being manipulated, i.e., vulnerable stocks. Including vulnerable stocks can potentially help better capture unobserved manipulation activity. To identify vulnerable stocks, we revisit the tests that examine the characteristics of stocks that are likely to be targeted by manipulators (Table 3). We classify a stock as vulnerable if it has a below median market capitalization, above median volatility, and liquidity in the middle two quartiles.[22]

The negative coefficients on the interaction terms in Table 4 indicate that both pumped stocks and vulnerable stocks have lower intraday volatility and 5-day volatility after ASIC's intervention. One of the potential reasons behind this result could be the reduction in manipulation activity in these stocks after the intervention since market manipulation, especially

[19] One of the messages of optimism sent by the group administrators reads, "Nobody is going to be charged for any illegal action. Nobody is going to be investigated by ASIC. We have done nothing but buy shares at the same time." In addition, anecdotal accounts also suggest that pump-and-dump activity on Telegram dissipated after ASIC's intervention (Shapiro and Richardson, 2021, Danckert, 2022).

[20] One of the two groups still active attempted to conduct a pump on January 18, 2022, however, it failed. If we include this pump in our sample, the post-intervention average pump return drops to 31%.

[21] In our tests, we use a pre-intervention window of two months and a post-intervention window of six months. We use a shorter pre-intervention window since most of the manipulation activity is concentrated in the two months preceding ASIC's intervention.

[22] Our results are robust to using either measure of volatility (intraday volatility or 5-day volatility) and either measure of liquidity (number of trades or dollar volume). The results in Table 4 use 5-day volatility and number of trades.

when it generates extreme price spikes as in the cases we study, increases volatility (Aggarwal and Wu, 2006). Overall, the evidence suggests that ASIC's intervention was effective in reducing social media manipulation activity in the Australian market.

< Table 4 >

5.2 Lessons from ASIC's intervention

Two factors are likely to contribute to the impact of ASIC's intervention. Firstly, it is possible that group members participate in pumps in the mistaken belief that they are not illegal. ASIC's post informs them about the illegal nature of these pumps and thus dissuades them from participating. Dhawan and Putniņš (2023) find that Telegram pump-and-dump schemes are popular in cryptocurrency markets because participants do not perceive them as being illegal. The same logic might also apply here. Admittedly, the legal position of cryptocurrency pump-and-dump schemes is murky, while pump-and-dump schemes in stock markets are definitely illegal. Given the relatively poor levels of basic financial literacy in Australia, at least a subset of participants might be unaware of the prohibited acts in stock markets and/or the general harms associated with market manipulation (Boedker, Moy, and Wu, 2022).

Secondly, it is possible that group members participate in these schemes in the mistaken belief that they are anonymous, and ASIC's message informs them that they are not. Telegram and Discord only display a user's chosen username to other users. This fact combined with the encrypted nature of these messaging platforms can create a false impression among users that their participation in these pumps cannot be traced back to them. However, as ASIC points out in their messages, they can examine trading data that contains trader identities around the time of the pump signal and use those data to identify suspects involved in the manipulation. This is where pumping stocks differs from pumping cryptocurrencies – the pseudo-anonymity of cryptocurrencies does not apply to stocks.

Such regulatory interventions are not without downsides. One potential downside is that if the regulator acts hastily, they could compromise their ability to prosecute the manipulators. These messages can be read by the manipulators and can thus alert them about the regulator's investigation against them. This could cause the manipulators to destroy or distort evidence, which can harm the regulator's case against them in court.

Such interventions work best if three requirements are met: (i) the activity in question is clearly market manipulation, (ii) the regulator has sufficient evidence to prosecute the manipulators (assuming the regulator intends to prosecute them), and (iii) there exists a platform (such as a chat group) for the regulator to directly communicate with the potential victims of the manipulation. In cases of blatant manipulation such as the Australian example, the benefits of the intervention (i.e., preventing innocent victims of the manipulation from losing their money) outweigh these costs. In other contexts, regulators must weigh up the costs and benefits before acting.

5.3 Social media surveillance

The emergence of social-media-based market manipulation schemes in some of the largest stock exchanges in the world points to a need for effective mechanisms to surveil social media. Regulators and exchanges already use market surveillance systems to detect market manipulation and insider trading by monitoring market activity. However, these systems might miss social media manipulation events like the ones we examine unless they have a significant impact on the market.

To detect such manipulation events, regulators and exchanges could use dedicated systems that trawl through social media to identify suspicious activity and then match it to deanonymized trading data. Using social media data in conjunction with market data can help reduce false positives relative to only using social media data since regulators can disregard stock mentions that are not accompanied by suspicious trading. Additionally, such a dual approach can also help build a more thorough record of evidence against the manipulators which can be used at the time of prosecution.

6. Conclusion

We find that social-media-based pump-and-dump manipulations conducted in online chat groups, which emerged in cryptocurrency markets, have spilled over into stock markets. This form of market manipulation is found in some of the largest stock exchanges in the world (Australia, India, and United States).

These pump-and-dumps are quick but cause extreme price and volume distortions. They are profitable for the manipulators. We find evidence consistent with manipulators exploiting overconfidence and gambling preferences of traders.

We also find that the Australian regulator's active intervention in these chat groups was effective in eradicating this manipulation activity. This entire episode serves as a key regulatory lesson that unconventional manipulation schemes such as these call for a proactive regulatory response.

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Table 1
Characteristics of social media pump-and-dump manipulations

This table reports statistics describing the characteristics of social media pump-and-dump manipulations. Pump duration, return, and volume statistics are calculated from the start of a pump to its peak. Pre-pump volume is the trading volume in the trading day before the pump. Manipulators' percentage and dollar profit for US and India are based on the actual profit figures reported by the SEC and SEBI. The profit figures for Australia are estimations. For Australia, manipulators' percentage profit from a pump is calculated as the percentage difference between the volume-weighted average price during the pump (from start to peak) and the volume-weighted average price in the trading day before the pump. Manipulators' dollar profit is calculated as their percentage profit multiplied by the pre-pump volume. The sample consists of 37 manipulations on five exchanges (Australian Securities Exchange, Bombay Stock Exchange, NASDAQ, National Stock Exchange, and New York Stock Exchange) across three countries (Australia, India, and United States) between September 2020 and April 2022.

	Australian pumps			Indian pumps			US pumps		
Variable	Mean	Standard deviation	Median	Mean	Standard deviation	Median	Mean	Standard deviation	Median
Pump duration (hours)	5.59	9.48	1.39	10.31	12.43	4.00	6.58	8.42	1.43
Opening return (%)	34.20%	87.40%	10.46%	3.27%	3.49%	3.12%	57.29%	209.79%	0%
Pump return (%)	83.82%	92.63%	53.14%	26.07%	20.81%	15.54%	106.74%	247.27%	21.84%
Pump return (number of standard deviations above the stock's average daily return)	10.12	10.50	8.79	7.06	6.14	3.84	12.94	30.66	3.03
Pre-pump volume ($ millions)	0.50	0.87	0.19	0.28	0.45	0.04	14.17	17.16	12.95
Pump volume ($ millions)	2.68	6.28	0.45	0.56	0.44	0.66	181.21	550.11	9.89
Pump volume (% of the stock's average daily volume)	1,113%	828%	902%	3,344%	4,658%	1,379%	387%	549%	174%
Manipulators' profit (%)	33.98%	21.85%	29.40%	2.00%	1.96%	2.39%	9.77%	9.76%	5.66%
Manipulators' profit ($ thousands)	241.62	655.86	53.82	2.40	4.43	0.25	1,167.52	2,167.38	232.29

Table 2
Effects of social media pump-and-dump manipulations

This table reports regression results testing how volume, return, and volatility are impacted by pump-and-dump manipulations. The regressions in this table use stock-day observations. Volume is the log dollar trading volume for the given stock-day. Volatility is the log of intraday volatility for the given stock-day (the difference between the highest and lowest trade prices scaled by the volume-weighted average price). Return is the percentage return for the stock from one day before (day –1) to 25 days after (day 25) the day of the stock-day observation. The main independent variable of interest is an indicator variable that equals one if a pump for the given stock occurs on the day of the stock-day observation. Other independent variables include indicator variables that equal one if the given stock-day is one day before, one day after, two days after, or three days after a pump. These regressions control for stock size using the log of market capitalization. All regressions control for exchange fixed effects, while some also control for stock or day fixed effects. The sample consists of 37 manipulations on five exchanges (Australian Securities Exchange, Bombay Stock Exchange, NASDAQ, National Stock Exchange, and New York Stock Exchange) across three countries (Australia, India, and United States) between September 2020 and April 2022. t-statistics are reported in parentheses below the coefficient estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Dependent variable =								
	Volume			Volatility			Return (day –1 to day 25)		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
One day before the pump	2.52***	1.50***	2.38***	0.86***	0.46***	0.88***	0.18	0.24	0.21
	(7.51)	(6.07)	(7.37)	(6.10)	(3.99)	(6.31)	(0.94)	(1.30)	(1.08)
Day of the pump	4.43***	3.46***	4.31***	1.76***	1.33***	1.75***	0.09	0.13	0.12
	(13.86)	(14.71)	(13.97)	(13.45)	(12.58)	(13.73)	(0.50)	(0.75)	(0.65)
One day after the pump	3.14***	2.17***	3.01***	1.07***	0.65***	1.11***	-0.05	-0.03	-0.02
	(9.82)	(9.22)	(9.77)	(8.23)	(6.13)	(8.66)	(-0.28)	(-0.16)	(-0.14)
Two days after the pump	2.34***	1.37***	2.18***	0.84***	0.42***	0.84***	-0.09	-0.07	-0.07
	(7.32)	(5.83)	(7.07)	(6.46)	(3.95)	(6.61)	(-0.58)	(-0.44)	(-0.41)
Three days after the pump	2.22***	1.25***	2.02***	0.67***	0.25**	0.67***	0.02	0.05	0.05
	(6.95)	(5.33)	(6.57)	(5.06)	(2.35)	(5.15)	(0.10)	(0.31)	(0.27)
Controls	Size	None	Size	Size	None	Size	Size	None	Size
Exchange fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock fixed effects	No	Yes	No	No	Yes	No	No	Yes	No
Day fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
R^2	76.96%	87.59%	78.58%	9.17%	40.89%	13.11%	0.15%	7.24%	1.07%
Observations	4,398,155	4,398,155	4,398,155	4,095,518	4,095,518	4,095,518	3,358,754	3,358,754	3,358,754

Table 3
Characteristics of stocks targeted by manipulators

This table reports the results of logistic regressions with stock observations examining the characteristics of stocks that are more likely to be targeted by manipulators. Pumped stock is an indicator variable that equals one for stocks that have been pumped at least once during the sample period. Below median capitalization is an indicator variable that equals one if the stock's market capitalization is below the median for the exchange. Below median price is an indicator variable that equals one if the stock's average closing price is below the median price in the exchange. Intraday volatility is the difference between the highest and lowest trade prices of the day scaled by the closing price and multiplied by 100. 5-day volatility is the standard deviation of the daily returns on the given day and the previous four trading days multiplied by 100. Short interest is the open short positions in the stock as a percentage of the total shares outstanding. Number of trades Q1, Q2, and Q3 are indicator variables that equal one if the stock is in the first (lowest), second, or third quartile by average daily number of trades. Dollar volume Q1, Q2, and Q3 are indicator variables that equal one if the stock is in the first (lowest), second, or third quartile by average daily dollar trading volume. All regressions control for exchange fixed effects. The sample includes all stocks listed on five exchanges (Australian Securities Exchange, Bombay Stock Exchange, NASDAQ, National Stock Exchange, and New York Stock Exchange) across three countries (Australia, India, and United States) between September 2020 and April 2022. Chi-square statistics are reported in parentheses below the coefficient estimates. Standard errors are clustered by coin and day. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Dependent variable = Pumped stock						
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	–6.94*** (363.84)	–7.28*** (282.64)	–6.86*** (674.98)	–6.69*** (699.89)	–6.27*** (257.64)	–7.00*** (180.4)	–7.00*** (180.4)
Below median market capitalization	1.27*** (10.94)						
Below median price		1.65*** (13.64)					
Intraday volatility			0.14*** (30.95)				
5-day volatility				0.16*** (27.93)			
Short interest					–0.36 (0.23)		
Number of trades Q1						0.00 (0.00)	
Number of trades Q2						1.39** (6.19)	
Number of trades Q3						1.18** (4.27)	
Dollar volume Q1							0.22 (0.11)
Dollar volume Q2							1.51*** (7.45)
Dollar volume Q3							0.92 (2.41)
Exchange fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.28%	0.32%	0.36%	0.31%	0.09%	0.28%	0.28%
Observations	13,707	13,707	13,706	13,707	6,421	13,707	13,707

Table 4
Effects of ASIC's intervention

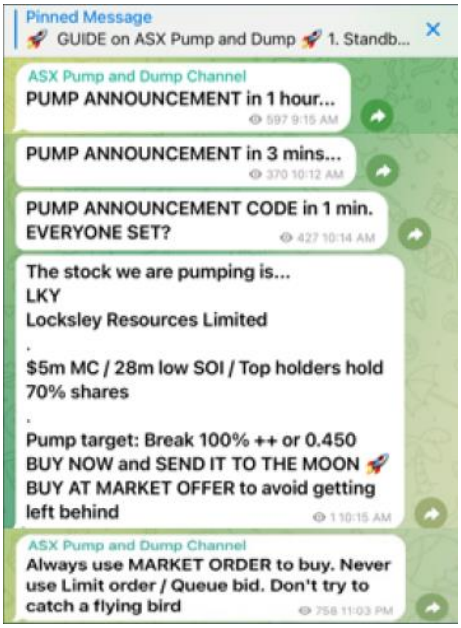
This table reports the results of difference-in-differences models with stock-day observations. Intraday volatility is the log of the difference between the highest and lowest trade prices of the day scaled by the closing price. 5-day volatility is the log of the standard deviation of the daily returns on the given day and the previous four trading days. Post-intervention is an indicator variable that equals one on all stock-days after the ASIC intervention. The pre-intervention window is two months long while the post-intervention window is six months long. Pumped stock is an indicator variable that equals one if the stock has been pumped at least once during the sample period. Vulnerable stock is an indicator variable that equals one if the stock has a below median market capitalization, above median volatility, and liquidity in the middle two quartiles. These are the characteristics of stocks that are typically targeted by manipulators. All regressions control for market volatility using the level of the S&P/ASX 200 VIX index. The sample includes all stocks listed on the Australian Securities Exchange. t statistics are in the parentheses below the coefficient estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, and ***, respectively.

	Dependent variable =			
	Intraday volatility		5-day volatility	
Variable	(1)	(2)	(3)	(4)
Intercept	–4.41***	–4.53***	–4.63***	–4.77***
	(–179.56)	(–192.66)	(–206.99)	(–225.27)
Post-intervention	–0.04***	–0.04***	–0.03***	–0.03***
	(–11.38)	(–10.07)	(–9.92)	(–9.00)
Pumped stock	0.70***		0.65***	
	(21.02)		(21.34)	
Pumped stock × Post-intervention	–0.13***		–0.17***	
	(–3.31)		(–4.86)	
Vulnerable stock		0.57***		0.62***
		(84.98)		(103.52)
Vulnerable stock × Post-intervention		–0.02***		–0.02***
		(–2.82)		(–3.44)
Australian VIX	0.46***	0.45***	0.43***	0.42***
	(47.07)	(48.87)	(48.15)	(50.46)
R^2	1.26%	9.79%	1.08%	11.81%
Observations	273,089	273,089	328,022	328,022

Panel A: Australian Telegram groups

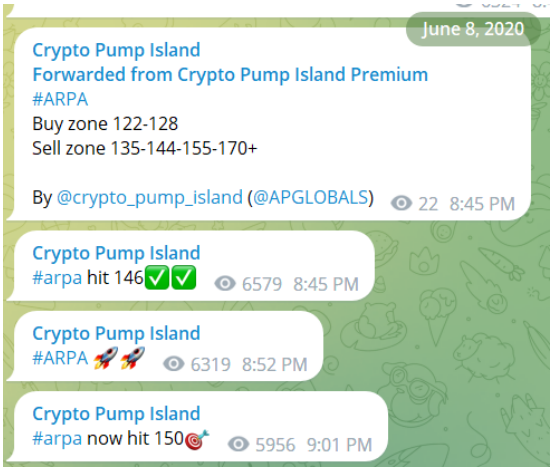
Crypto pump

Analogous stock market pump



Panel B: Indian Telegram groups

Crypto pump



Analogous stock market pump

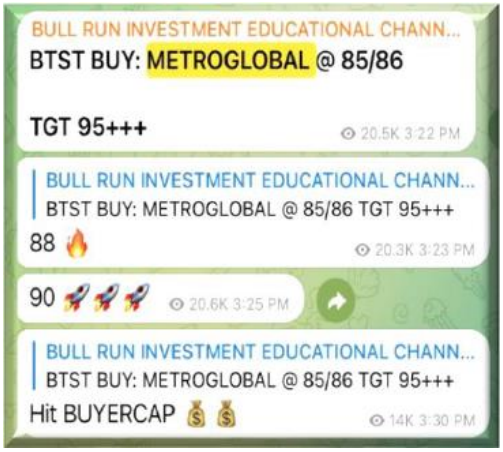


Figure 1. Sample pump messages sent on Australian and Indian Telegram pump-and-dump groups.
This figure shows examples of messages sent on Telegram pump-and-dump groups operating in the Australian and Indian stock markets, comparing to them to very similar pump messages that are used in cryptocurrency pump-and-dump groups. Panel A shows a screenshot of messages sent on the Australian Telegram group 'ASX Pump and dump Channel'. In this message, the administrators send a 'pump signal', i.e., a message stating that they intend to pump a particular stock. In this instance, the stock being pumped is 'LKY'. The administrators also indicate a 'target price' of AUD 0.45. Panel B shows a screenshot of messages sent on the Indian Telegram group 'Bull Run Investment Educational Channel'. At 15:22, the group administrators advise the group members to 'buy today, sell tomorrow' (i.e., 'BTST') the stock 'METROGLOBAL' at a price of INR 85 or 86, and indicate a 'target price' (i.e., 'TGT') above INR 95. Within a few minutes of the initial message, the administrators report increases in the price of the stock, first to INR 88 (15:23) and then to INR 90 (15:25). Lastly, at 15:30, the administrators inform the members that the stock has hit the 'buyer cap', i.e., a situation in which there are only buyers for the stock in the market.

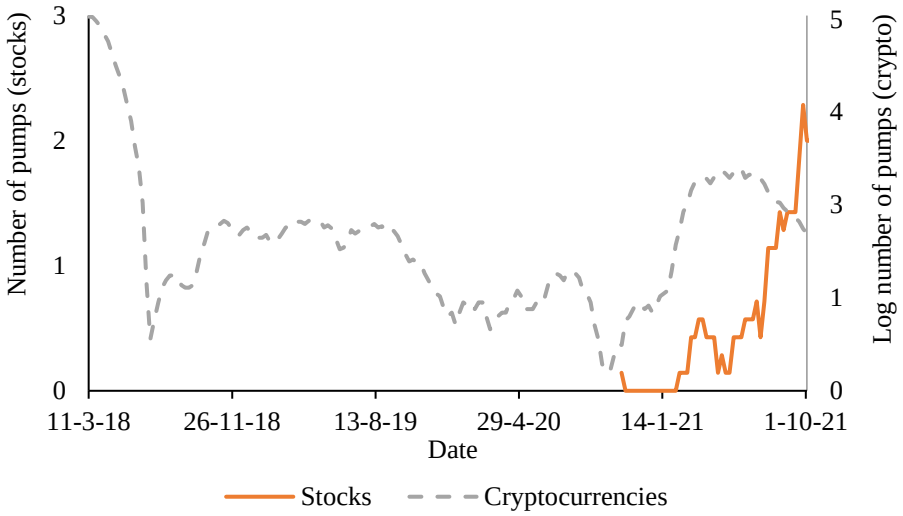
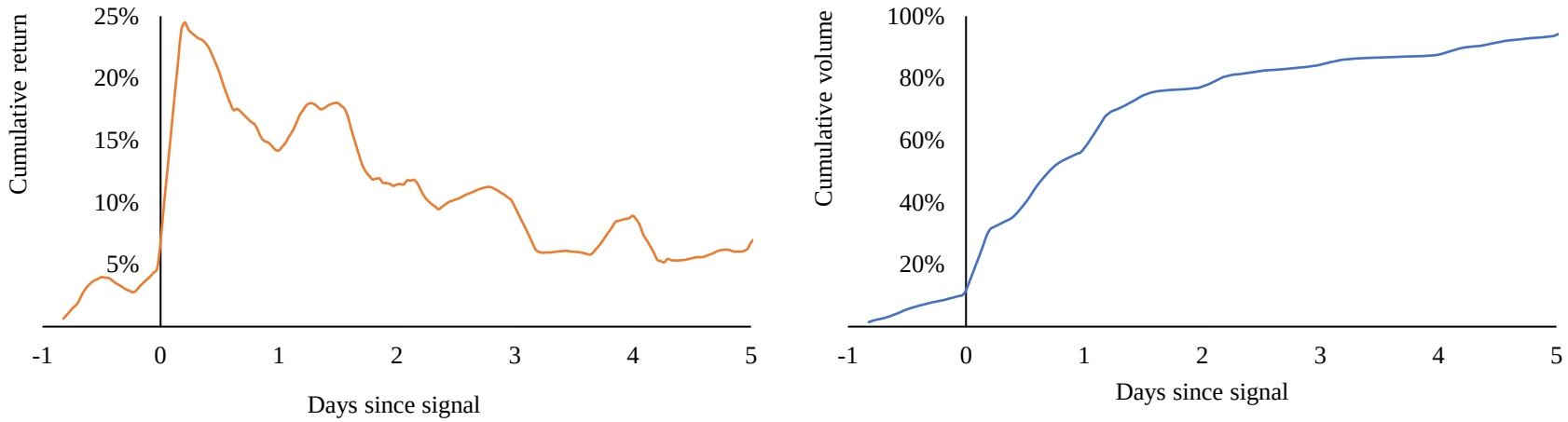


Figure 2. Pump-and-dump activity through time in stock and cryptocurrency markets.
This figure plots the level of pump-and-dump activity in stock and cryptocurrency markets from March 2018 to October 2021. The figure plots seven-week moving averages. For cryptocurrencies, number of pumps is plotted on a logarithmic scale.

Panel A: Pumps with low first-day returns



Panel B: Pumps with high first-day returns

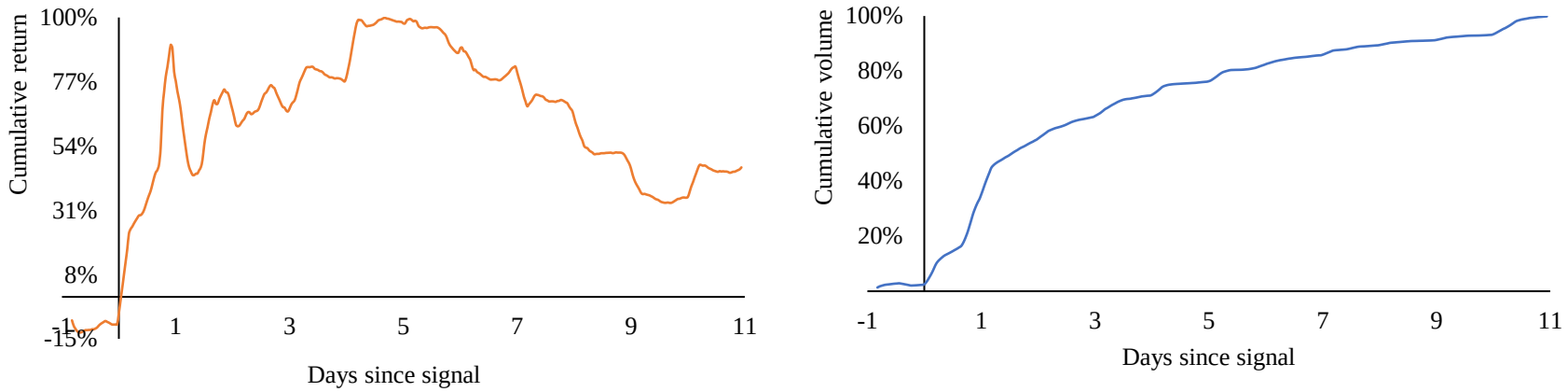


Figure 3. Return and volume dynamics during pump-and-dump manipulations on the Australian Securities Exchange.
The figure plots average cumulative returns and average cumulative volumes during pump-and-dump manipulation episodes on the Australian Securities Exchange. In all plots, $t = 0$ is the day of the pump signal. Panel A plots pumps with low first-day returns (below 30%). Panel B plots pumps with high first day returns (above 30%). In Panel A (Panel B), the cumulative returns and volumes are measured in ten-minute intervals from one day before the pump signal until five days (ten days) after the pump signal. Cumulative volume in Panel A (Panel B) is measured as a percentage of the total trading volume from one day before the pump signal until five days (ten days) after the pump signal. All variables are smoothed using a seven-day moving average.

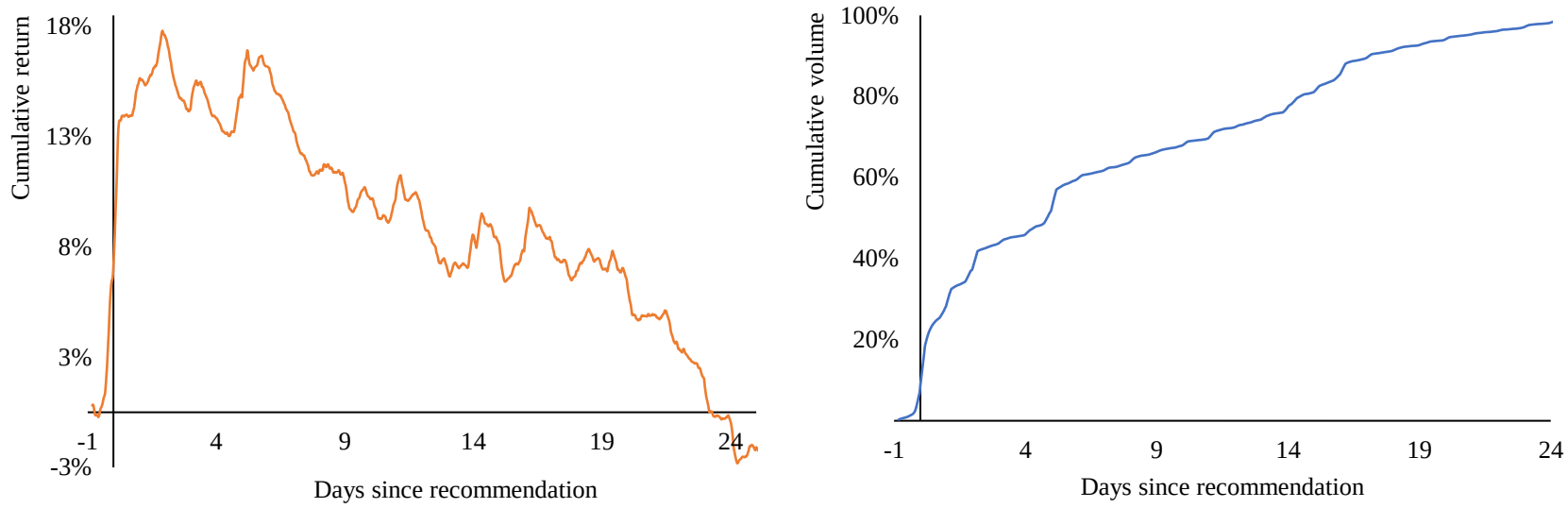


Figure 4. Return and volume dynamics during pump-and-dump manipulations on Indian exchanges.
The figure plots average cumulative returns and average cumulative volumes during pump-and-dump manipulation episodes on two Indian exchanges, i.e., Bombay Stock Exchange and National Stock Exchange. In both plots, $t = 0$ is the day of the stock recommendation. The cumulative returns and volumes are measured in ten-minute intervals from one day before the stock recommendation until 25 days after the stock recommendation. Cumulative volume is measured as a percentage of the total trading volume from one day before the pump signal until 25 days after the stock recommendation. All variables are smoothed using a seven-interval moving average.

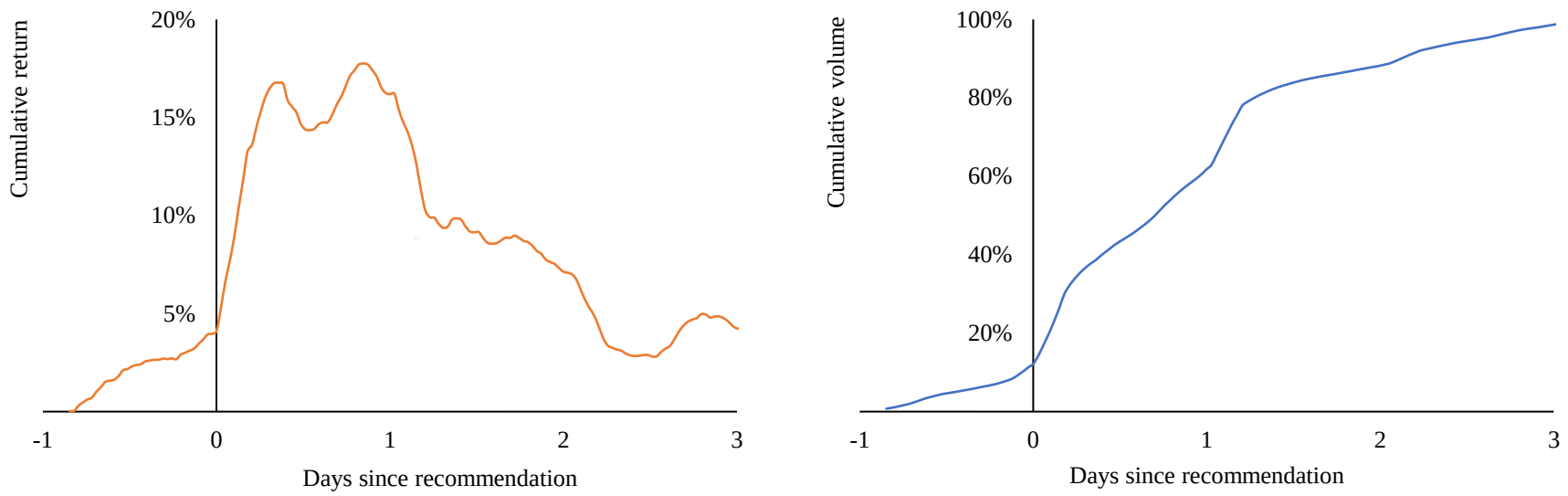


Figure 5. Return and volume dynamics during pump-and-dump manipulations on American exchanges.
The figure plots average cumulative returns and average cumulative volumes during pump-and-dump manipulation episodes on two American exchanges, i.e., NASDAQ and New York Stock Exchange. In both plots, $t = 0$ is the day of the stock recommendation. The cumulative returns and volumes are measured in ten-minute intervals from one day before the stock recommendation until three days after the stock recommendation. Cumulative volume is measured as a percentage of the total trading volume from one day before the stock recommendation until three days after the stock recommendation. All variables are smoothed using a seven-interval moving average.

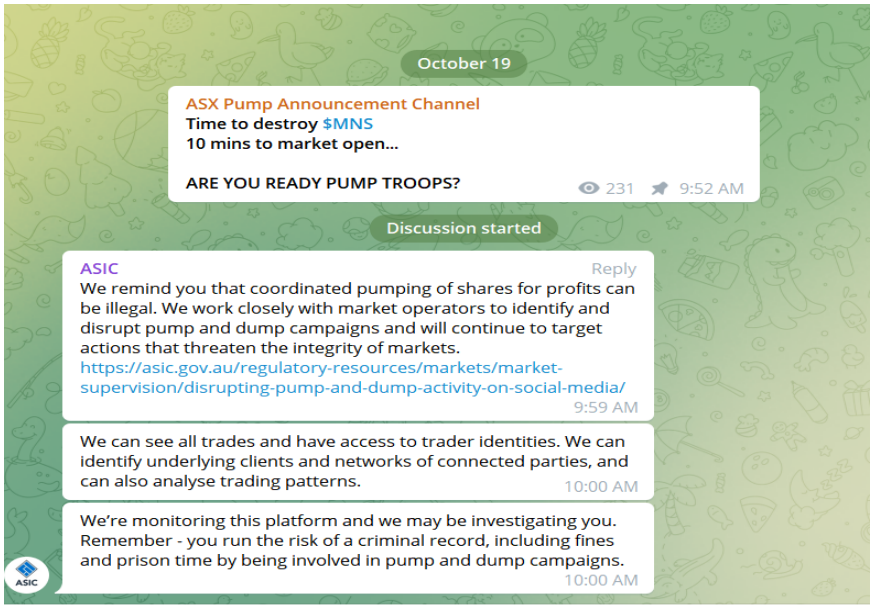


Figure 6. ASIC warning on a Telegram pump-and-dump group.
The figure shows messages sent by the Australian Securities and Investment Commission (ASIC) on the 'ASX Pump Announcement Channel' Telegram group to warn the administrators and members against participating in pump-and-dump schemes. ASIC issued this warning after the group administrators sent a message encouraging the members to pump the stock 'MNS'.