**Real Returns from Unreal World?**

**Market reaction to Metaverse Disclosures**

**Abstract**

In this study, we present a first attempt at measuring the market reaction to firms’ SEC disclosures related to *Metaverse* activity. We follow the existing literature in differentiating between disclosures associated with vague future intentions or plans to adopt *Metaverse* activity (“*Vague*”), and announcements concerning actual activities related to the *Metaverse* infrastructure (“*Clear*”). *Clear* disclosures are associated with higher abnormal returns, in contrast to *Vague* ones leading to a milder response by investors in the days surrounding the disclosure. Early adopters and large-cap firms earn higher abnormal returns immediately following *Metaverse* disclosures than do late adopters and small-capcompanies. Although the *Metaverse* may represent a potential growth engine for firms in the future, we document a short-term positive overreaction in share price behavior that is completely reversed within the 30 days following the announcements, regardless of the size of companies, the timing of the disclosure, or whether the disclosure was *Clear* or *Vague*.

**Keywords**: Metaverse; blockchain; stock returns; overreaction; reversal; abnormal returns; cumulative abnormal returns; mispricing; market model; market-adjusted model

**JEL classifications:** G12, G15

1. **Introduction**

How does the market refer to a novel technology infrastructure? Does the so-called “*next generation of the internet*” – the virtual reality of *Metaverse* – have any value in the eyes of investors in the real world? Or is this simply an example of a short-term behavioral response to the hype surrounding *Metaverse* and novel blockchain-based derivatives? We are motivated to explore these questions, given the rapidly growing attention by individuals and firms, as well as regulators, who are confronted with this state-of-the-art technology infrastructure, considered by practitioners as a potential technology turning point.

Contrary to the common conception, the *Metaverse* is not only related to the gaming field. It is expected to become involved in and accommodate many economic sectors, including healthcare, education, social commerce, advertising, smart manufacturing, and many others. The *Metaverse* economy, according to Grand View Research (2022), reached a market size of USD 38.85 billion in 2021 and is forecast to enjoy a compound annual growth rate of 39.4% from 2022 to 2030. Under these assumptions, the *Metaverse* could reach a scale of nearly USD 772.24 billion by 2030. More recently, Citibank, one of the world’s largest financial institutions, declared the *Metaverse* to be the “*next generation of the internet*” expected to fulfill and promote the development of the Web3 economy concept. According to the bank’s forecasts, the *Metaverse* economy could even reach a value of between USD 8 trillion and USD 13 trillion by 2030.[[1]](#footnote-1) Moreover, the *Metaverse* will not only involve the traditional fiat currencies but is also expected to support a wide range of cash mediums, such as central bank digital currencies, cryptocurrencies, and blockchain-based products, such as non-fungible tokens (NFTs) and Stablecoins. From this viewpoint, the *Metaverse* may capture a central position in the future of financial institutions, as they provide support for the execution of financial activity and settlement throughout the *Metaverse*. Regulators and policymakers will also have to delve deeper into the significance of the *Metaverse*, as a legal framework is needed to shape this new infrastructure.

Several milestones at the end of 2021 have accelerated the rapidly growing interest in the *Metaverse* infrastructure. These include, among others: the growth in non-fungible token (NFTs) trading and the interest and investment in the *Metaverse* space by several major technology firms, including CEO Mark Zuckerberg’s announcement renaming of Facebook as Meta. Lastly, and no less importantly, COVID-19 has also played an important part in the growing interest in *Metaverse*, as the pandemic forced people to spend more time at home, using internet and digital-based services more intensively.

Our study joins the literature exploring the market reaction to the employment of innovative technologies and revolutionary knowledge. Such studies include recent works exploring the contribution of innovative blockchain technology to firm value (Cheng et al. 2019; Cahill et al. 2020; Klöckner et al. 2022) and earlier studies around the dot-com bubble, as firms signaled their use of the internet (e.g., Cooper et al. 2001). In the same vein, we analyze whether disclosures related to the *virtual world* of the *Metaverse* are priced in the real world. To the best of our knowledge, our paper represents a first attempt to explore this question.

In this study, we categorize disclosures as “*Clear”* (*de facto* new plans for partnerships or actual investments in firms with *Metaverse* platforms through mergers, acquisitions, launching new initiatives or applications, enhancing, or adding Metaverse features to their platforms) and “*Vague”* (including vague information concerning plans to develop technologies or allocate resources for R&D, or general statements of involvement or capabilities). We find that the abnormal return following “*Clear”* disclosures is higher than for “*Vague”* announcements, signaling that the market may be cautious in response to *Vague* intentions, and prefers concrete actions or plans than the expression of general intentions to embrace the *Metaverse*. Consistent with Cheng et al. (2019), we find that while there are positive abnormal returns around *Metaverse* disclosures, this effect completely vanished within the subsequent 30 days, demonstrating a typical reversal phenomenon for both types of disclosure.

The remainder of the paper is organized as follows. In section 2 we review the literature, in section 3 we describe our sample construction and data sources, in section 4 we present our proposed methodology, in section 5 we report our main findings, and we summarize our results in the last section.

1. **Historical Background and Literature Review**

The *Metaverse* is considered as the successor to the mobile internet. Although the term *Metaverse* can be traced back to 1992 (in the science fiction novel *Snow Crash* by Neal Stephenson), the interest of the general public, investors, and the media mainly rose at the end of 2021. Recently, CEO Jensen Huang (Nvidia) has argued that the *Metaverse* will be much bigger than the physical world. Many leading tech companies have already taken steps to capitalize on the *Metaverse* trend and consumer brands are also developing plans for *Metaverse* platforms (Kim, 2021). The *Metaverse* can be defined as “a post-reality universe, a perpetual and persistent multiuser environment merging physical reality with digital virtuality” (Mystakidis, 2022, p.486). The *Metaverse* is expected to reshape how businesses and consumers interact with products, services, and each other. Companies will offer richer customer experiences, introduce and market physical and digital products and services, and support *Metaverse* payments and finance (PWC, nd.).

These current opportunities and future prospects lead firms to develop activities and strategies for the *Metaverse* platform. We analyze the impact of SEC disclosures related to the *Metaverse* on market reaction. To our knowledge, there is no prior research on the market reaction to *Metaverse* disclosures, and we present here a first attempt to measure the effect of *Metaverse* disclosures on stock returns. However, there is a body of research exploring the stock market reaction to blockchain and/or Bitcoin-related disclosures, which can be linked to our research idea. Blockchain is considered one of the most important technological revolutions of the last decade, and several studies explore how its adoption may influence the financial markets. Currently, the adoption of the *Metaverse* has created new hype and prospects. The *Metaverse* is considered a natural playground for further exploiting the advantages and opportunities of digital coins and cryptocurrencies.

Cheng et al. (2019) consider the relationship between listed firms’ initial 8-K disclosures concerning blockchain-related technologies and investors’ responses. The activities that firms present in those disclosures are categorized as either “*Speculative*” (companies providing vague future plans for Blockchain) or “*Existing*” (companies having a clear plan for Blockchain implementation). There is a 7.5% positive abnormal return for *Speculative* disclosures, while it is close to zero for *Existing* disclosures. These positive reactions are reversed within 30 days, implying the overreaction of investors to *Speculative* disclosures. Further analysis shows that the market reactions to announcements are positive when Bitcoin prices are high, and the effect disappears during market downturns.

Cahill et al. (2020) explored the market response to blockchain-related announcements by using an international sample of 713 companies between 2016 and 2018. The average abnormal return on the day of the announcement is 5.3%, with a significantly higher return for smaller-size firms and U.S. firms. There is an increase in cumulative abnormal returns in the pre-announcement period, while the post-announcement window [2, 20] shows a significant and negative CAR.

Li et al. (2022) analyze the short-term and long-term performance of companies engaging in blockchain-related businesses in China during the 2013–2018 period. In the short term, involvement in the blockchain industry reduces stock returns and financial performance. However, there is no statistically significant difference in the volatility of stock returns. In the long run, entering the blockchain industry is associated with a decline in stock returns, ROA, and volatility.

Yen and Wang (2021) collect 181 blockchain and cryptocurrency disclosures in 10-K filings for the period from 2014 to 2018. They show that these disclosures are value relevant. However, a further analysis indicates that only blockchain-related disclosures create value while cryptocurrency-related disclosures are not associated with changes in firm value. In terms of the topics or themes of the disclosures, only disclosures mentioning blockchain technology solutions and risk factors lead to positive value relevance. Disclosure of bitcoin transactions has negative value relevance.

Autore et al. (2021) constructed a sample of 249 firms mentioned in articles on blockchain technology investment. There is a 13% positive stock price reaction to the first announcement concerning investment in blockchain technology. This reaction is reversed within the next three months. However, the credibility of these investments matters for market value. Blockchain investments that are at an advanced stage or are mentioned in subsequent financial statements are associated with higher initial reactions and with little or no reversal. This implies that investors consider credible investment as a value-enhancing decision.

Recently, Klöckner et al. (2022) collected 175 announcements from 100 firms in 15 countries to analyze how blockchain initiatives in operations and supply chain management affect the market value of the firm. There is no stock market reaction two days before and after the announcement. The only statistically significant positive abnormal return is on the day of the announcement. The announcement of blockchain applications used to trace physical objects or to store sensitive data induces a decrease in abnormal returns. Firms that are more productive have a higher abnormal return while firms with higher levels of innovation and market-to-book ratios exhibit lower abnormal returns.

Another strand in the literature explores how company names changes related to Blockchain and Bitcoin affect firm performance. Jain and Jain (2019) document that firms that changed their name to include the word “blockchain” or “bitcoin” experienced a positive abnormal return for two months. The positive abnormal returns become negative five months after the name change. Akyildirim et al. (2020) show that adding words related to “blockchain” or “cryptocurrency” in the corporate name is associated with a decrease in the short-term level of profitability while crypto-related name changes lead to pricing premiums that persist for up to six months. The name changes increase the volatility of returns, making investing in the companies much riskier.

To summarize, while the works reviewed above focus entirely on blockchain, Bitcoin and cryptocurrencies, we contribute by exploring a new but related avenue. We present a first attempt to test investors’ response to the *Metaverse* technology by testing how related disclosures are priced in the short term. To the best of our knowledge, there is no prior research on this topic, and we present here a first attempt to measure the effect of *Metaverse*-related disclosures on stock returns.

1. **Sample Construction, Data Sources**

We extract all disclosures containing the word “*Metaverse*” that were submitted to the SEC between January 1, 2014, and January 26, 2022. On the last date, we began collecting the data required for the empirical research. Although the term *Metaverse* evolved during 2021, we searched for disclosures starting in 2014 to remove any risk of ignoring previous disclosures. This procedure yielded 382 results, beginning in April 2021.

Understandably, mentioning the word “*Metaverse*” in a disclosure does not necessarily mean that it is a *Metaverse*-related disclosure *per se*. To verify our sample of *Metaverse*-related disclosures, we manually checked and read each result, confirming that each disclosure met two main criteria: 1) It is a disclosure by a publicly-listed firm, making stock price response measurable; 2) It discloses intentions or plans for adopting *Metaverse*, or alternatively, it reveals actual participation in the *Metaverse* platform. Any disclosure containing only a general mention of the word *Metaverse* was excluded from the sample. These two conditions above led to the removal of 268 disclosures. Next, we removed 29 duplicate or parallel disclosures[[2]](#footnote-2) within the span of five days, and finally also excluded 8 disclosures of OTC stocks, leaving uswith 77 disclosures from 51 firms. The detailed screening procedure is presented in **Appendix A**.

It is worth mentioning that in the subsequent analyses, we also divided our total sample into several groups to determine whether the results are consistent across groups or whether they differ in accordance with the definition of disclosures we enter into the final sample: ***Full Sample*** (all observations that meet the main two conditions),***Full Sample excluding Repetitive Reports*** (all observations that meet the main two conditions excluding repetitive disclosures), ***Full Sample excluding Financial Reports*** (all observations that meet the main two conditions, excluding cases where the *Metaverse* was mentioned as part of an overlapping financial report or firm's performance), and finally ***Full Sample excluding Repetitive*** ***and Financial Reports*** (all observations that meet the main two conditions, excluding repetitive announcements about *Metaverse* plans by the same firm or where the *Metaverse* was mentioned as part of an overlapping financial report or firm's performance).

In line with Cahill et al. (2020) and Cheng et al. (2019), who identified “*Existing”* and “*Speculative”* disclosures, we categorized SEC disclosures as either “*Clear”* or “*Vague.”* *Clear* disclosures are *de facto* new plans for partnerships or actual investments in firms with *Metaverse* platforms through mergers, acquisitions, launching new initiatives or applications, enhancing, or adding *Metaverse* features to their platforms. *Vague* disclosures include vague declarations describing future possible opportunities or firms’ plans about developing certain technologies or allocate resources for R&D, or general statements of intentions, involvement or capabilities. Finally, for each firm, we extracted the required daily stock prices from the Yahoo Finance website.[[3]](#footnote-3)

**Panel A** in **Table 1** shows the types of disclosures that compose the sample. Of the total 77 disclosures, 24 are *Clear* while 53 are classified as *Vague*. During 2021, 62 disclosures were released, whereas during January 2022, 15 disclosures published publicly. **Panel B** in **Table 1** shows that most firms in the sample (55%) are headquartered in the United States and 18% are in China. Most firms (nearly 70%) are in the Technology or Communication Services sectors, with the Industrial and Real Estate sectors having only one disclosure each.

**-Insert Tables 1 & 2 -**

**Table 2** displays a general descriptive analysis of the firms included in the sample. The average firm has total assets of 11,200,383 (thousand USD) and a market capitalization of 79,634,616 (thousand USD). The average (median) share price is USD 38.12 (USD 6.62) and the average (median) financial leverage is 2.21 (0.66). The standard deviation of the examined variables and a comparison of median and mean values suggest that the sample consisted of a wide variety of firms.

1. **Methodology**

The paper uses the event-study methodology to analyze stocks’ performance around the announcement day (Cahill et al. 2020; Cheng et al. 2019; Nerget et al. 2021). To determine the event date (t=0), we compare the filing date when the announcement was submitted to the SEC and the date that appears on the announcement itself. In cases where the date on the form is earlier and an identical press release is published on the company’s website on that date, the earlier date is used for the event date, as this is the date when the information first became public. Otherwise, the filing date is used as the event date. For each company, we calculated the natural logarithm of returns and estimated abnormal return (for firm i on day t by extracting the residuals from the market model, as described in Eq. (1) below:

(1)

where is the log daily return of the firm stock i on day t, is the log daily return of the S&P 500 index for day t, and are regression estimates for the parameters using data from 252 historical trading days ending 30 days before the event date. For each firm, we aggregated the abnormal returns for selected time windows [T1,T2] around the event to obtain the cumulative abnormal return () as described in Eq. (2) below:

(2)

The cumulative average abnormal return () is calculated for all firms as follows:

(3)

To obtain a test statistic for a t-test of significance, we employed the following:

(4)

where is estimated as follows:

(5)

As an alternative model, we also used the market adjusted model where we set the value of estimates to = 0 and = 1, in Eq. (1) above.

1. **Empirical Findings**

We begin by describing several milestones during the period studied regarding the prevalence of *Metaverse* Disclosures. **Figure 1** shows the monthly frequency of *Metaverse* disclosures in parallel to the cumulative abnormal returns in terms of CAAR [0,1]. The first ever *Metaverse* Disclosure in April 2021 was the single disclosure that month. While September 2021 appears to be the month during which the highest abnormal returns were achieved (+9.07%), November 2021 is associated with the highest number of *Metaverse* disclosures (24). The latter could represent a spillover of disclosures following the October 28 2021 announcement by Facebook of its name change to Meta as part of its strategy of shifting towards the *Metaverse* for the future.

**-Insert Figure 1-**

Next, we turn to the discussion of our main results with an inspection of the CAAR as described in **Figure 2a and Figure 2b** by the market model. **Figure 2a** depicts the evolution of CAAR with respect to the four different defined categories of our sample, as explained in Section 3: ***1) Full Sample***, ***2) Full Sample*** ***excluding Repetitive Reports, 3) Full Sample*** ***excluding Financial Reports***, and *4)* ***Full Sample*** ***excluding Repetitive and Financial Reports****.*

As can be seen from the top graph, the results did not differ substantially across our sample of differently defined sample categories. There is empirical evidence for a positive effect on share price surrounding the *Metaverse* announcement day, which extends into the days following the announcement. However, these positive abnormal gains mostly reverse within 20 days following the announcement. Extending the event window to 30 days shows a complete reversal regardless of the sample definition, which is followed by further declines in equity return for *Metaverse* disclosures.

**-Insert Figure 2a & 2b-**

**Figure 2b** describes the evolution of abnormal returns when we distinguish between *Clear* and *Vague* disclosures. The overall general picture remains the same as in the general case described above. For both types of disclosures, the market responds to *Metaverse*-related announcements with positive abnormal returns, but this effect is reversed within the 30 days following the announcement. Notably, the market response seems to favor *Clear* disclosures over *Vague* ones. For *Clear* disclosures, nearly 7% of abnormal returns are obtained on the day of the announcement and the day following it, compared with 2% for *Vague* disclosures. While all returns are completely reversed within 30 days after an announcement, this reversal is even faster following *Vague* disclosures. Looking at **Figure 2b**, reversal is complete approximately 7 days after *Vague* disclosure, whereas it takes 19 days following *Clear* disclosures. In line with previous results, it is worth noting that extending the event window for 30 days after *Metaverse* disclosures clearly shows a full reversal, which is followed by even further declines in stock prices, regardless of the sample definition. Therefore, it may be concluded that the reaction following the *Metaverse* announcement is more likely to be a behavioral phenomenon in response to the hype around it, rather than a true pricing.

**Table 3** presents the cumulative average abnormal return (CAAR) for selected time windows around the event date, using several sample definitions. We use two different models to compute abnormal returns. **Panel A** reports the CAAR based on the market model, and **Panel B** presents the results using the market adjusted model.

While the abnormal return before the announcement day is insignificant, there is a positive significant CAAR for the period including the announcement day and the following day: the [0,1] time window. The entire sample yields a CAAR of 2.50% (t=2.12). As can be seen from **Table 3**, the results remained similar under different other definitions of the sample: For the ***Full Sample*** ***excluding Repetitive Reports,*** there is a positive CAAR of 2.79% (t=1.98), for the ***Full Sample*** ***excluding Financial Reports*,** there is a CAAR of 2.91% (t=1.85), and for the ***Full Sample*** ***excluding Repetitive and Financial Reports***, the CAAR rises to 4.00% (t=2.18).

**-Insert Table 3 -**

Finally, the results may imply interesting careful conclusion that investors may be cautious and perhaps prefer to avoid vague statements about *Metaverse* in favor of actual future plans or progress on *Metaverse*-related initiatives. *Clear* disclosures yield a positive significant CAAR of 6.98% (t=3.26) whereas *Vague* disclosures yield a CAAR of only 0.94% (t=0.67), which is insignificant. That is, investors may wish to “hold on something real in an unreal *Metaverse* world.”

**5.1 Robustness Tests**

Motivated to check the robustness of our results, we also calculated CAAR according to the Fama-French three-factor model (Fama and French 1993). CAAR results are summarized in **Table 4**.

**-Insert Table 4 -**

As can be seen from this table, the results are essentially similar to those obtained from both the market model and the market-adjusted model. For the entire sample, CAAR is insignificant prior to the *Metaverse*-related disclosure, then turns significantly positive (2.74%, t=2.32) on the day of the disclosure and the day following it [0,1]. Returns are completely reversed in the post-disclosure period, with significant negative CAAR of -6.19% for the [2,20] window. Similar results are obtained when we use any other definition of our examined set of disclosures, with a tendency for positive and significant abnormal returns around the time of disclosure and a full reversal at the end of our study period. For example, the sample defined as “Full Sample excluding Repetitive Reports” shows a significant positive response (2.87%, t=2.32) on the day of the disclosure and the day following it [0,1], and a reversal with a significant negative CAAR of -4.96% for the [2,20] window.

As with our previous results, we again document a clearly different response for *Clear* disclosures compared with *Vague* disclosures. While *Clear* disclosures yield a positive and significant CAAR of 6.79% (t=3.14) on the day of the disclosure and the day following it [0,1], *Vague* disclosures are associated with an insignificant positive CAAR of 1.37% (t=0.97). These results again underscore the possibility that the market response to announcements about vague *Metaverse*-related intentions is more conservative than to announcements about actual activity in the *Metaverse*, which are followed by a significant positive response. Nevertheless, these returns ultimately completely reversed at the end of the event window studied (a significant negative CAAR of -7.48% and -6.45% for the *Clear* and *Vague* disclosures, respectively).

Next, we tested whether the stock price level may affect our key findings, focusing on low prices. To this end, we excluded 11 disclosures of penny stocks under $1 (“Full excluding Price<$1”) from the entire sample. The results again suggest an initial positive impact followed by a reversal, indicating that the main results for all stocks are probably not driven or affected by the behavior of low priced stocks.

**5.2. Further Examinations**

**5.2.1 Does Timing Matter?**

An interesting question that arises is whether being a pioneer in disclosing a firm’s involvement with a novel technology is rewarded by the market. More specifically, we examined whether the market differentiates between announcements by “Early Adopters,” those leading companies that release their *Metaverse* information at the very beginning or during the first wave of *Metaverse* disclosures, and announcements made later by so-called lagging companies. To answer this, we divided our sample into *Leading* and *Lagging* groups for disclosures and again tracked the evolution of CAAR during the investigated period.[[4]](#footnote-4)

The general picture, as seen in **Figure 3**, shows that Early Adopters (“Leading”) enjoy higher abnormal returns compared to Late Adopters (“Lagging”), although these returns are apparently fully reversed at the end of the 30-day window. Interestingly, the reversal process is slower for “Leading” disclosures compared to the rapid 4-day reversals experienced after “Lagging” disclosures. Combining the latter finding with the overreaction of investors to the early disclosures verifies again our view that *Metaverse* disclosure perhaps does not represent a true pricing of future *Metaverse* Activity, but rather reflects more of the hype around the announcement. **Table 5** reports in detail the full results of CAAR for different models and periods around the disclosure.

**-Insert Figure 3 & Table 5 -**

**5.2.2 Does Size Matter?**

The size of companies disclosing their *Metaverse* plans is another important factor to be examined. Specifically, we want to study whether the size of the firm plays a role in determining the market response to *Metaverse* disclosures. Therefore, we classified firms according to their market capitalization 30 days prior to the *Metaverse* disclosure, with two size-groups: large-cap (“Big”) and small-cap (“Small”) firms. The results are summarized in **Figure 4** and details of the CAAR in different periods are reported in **Table 6**. According to Panel A reporting the CAAR arrived at by the Market model, a positive impact is associated with both Big and Small firms around the time of the announcement day and the following day [0,1], although Big firms enjoy higher returns. Big firms yield a positive significant CAAR of 3.13%, whereas small firms yield a CAAR of only 1.89%. Panel C presents similar results, applying the Fama-French (1993) three-factor model. Large-cap companies are associated with a positive significant CAAR of 3.65%, with small-cap companies having a CAAR [0,1] of only 1.86%, indicating a different market response to large versus small firms.

**Figure 4** verifies these findings, indicating that relatively large-cap firms, rather than small-cap ones, tend to be associated with greater CAAR across time. However, the abnormal returns are fully reversed for both groups within 30 days after disclosure, with reversal occurring more rapidly for the group of small firms. Consistent with earlier results about the timing of disclosures, the reversal process is rapid for small companies, reaching completion about one week following the *Metaverse* disclosures. This process is longer for large companies, with returns initially declining markedly within about 15 days, followed by further declines in equity prices, with any positive impact completely dissipating by the 30th day following the announcement.

**-Insert Figure 4 & Table 6 -**

To summarize, the size factor is significant only with respect to the positive response close to the narrow period of the disclosure as well as the length of time of the reversal. While a larger size may slow the reversal, it cannot prevent it. This lends further support to the conclusion that the *Metaverse* currently offers no real value in pricing and is more likely creating a behavioral response to the buzz or hype around it.

**6. Conclusions**

This study presents a first attempt at examining market response to firms’ *Metaverse*-related disclosures. Using an event study methodology, we documented a significant positive abnormal return ranging from 2.50% to 3.11% for the two-day period including the announcement day and the day after. However, this positive response is completely reversed within the following 30 days. These results hold when using different statistical models for the measurement of abnormal return, including the market model, the market adjusted model, and the Fama-French three-factor model.

The documented reversal in abnormal returns suggests that investors’ response is likely to be a short-term behavioral response to the hype surrounding the *Metaverse* concept. Splitting disclosures into *Clear* and *Vague* ones show reversal is complete within the following 30 days for both types of disclosures. However, *Clear* disclosures earn higher abnormal returns than *Vague* releases, suggesting that, even in the wake of the *Metaverse* trend, investors tend to treat *Vague* releases more cautiously. Further examinations show that “Leading” disclosures result in positive returns that exceed those for “Late Adopters” of the *Metaverse*. Similar trends emerged after classifying firms according to their market capitalization, with big firms disclosing their *Metaverse* intentions earning higher abnormal returns than small firms doing so. Even with varying market responses for Early versus Late Adopters of the *Metaverse*, and for large- versus small-cap firms, immediate gains are ultimately erased within a maximum of 30 days for all types of disclosures or firms in our sample. Interestingly, the reversal is much faster for small-cap firms and Late Adopters than it is for large-cap firms and Early Adopters.

This study represents the first effort to examine market response to *Metaverse* disclosures. However, a limitation of this study is the small sample size, given that *Metaverse* disclosures began only in 2021. Future studies could extend the length of the period investigated and employ an in-depth investigation of the factors that could drive the abnormal returns experienced around *Metaverse* disclosures.

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**Figure 1: The Prevalence of Metaverse Disclosures**

*Notes*: The graph above presents the prevalence of Metaverse disclosures by public companies according to a monthly breakdown and their corresponding CAAR [0,1]. The first Metaverse disclosure ever took place in April 2021. The highest CAAR [0,1] are apparently achieved in September 2021, while the highest number of Metaverse disclosures took place in November 2021.

**Figure 2: Cumulative abnormal returns for *Metaverse* disclosures**

**Figure 2a: Different Subsamples of *Metaverse* Disclosures**

**Figure 2b: Market Response to *Clear* versus *Vague* *Metaverse* Disclosures**

*Notes*: The Figures depict the development of the CAAR from 7 days before the event up to 30 days after it, as estimated by the market model. Figure 2a refers to the three broad sample definitions described in the data section. Figure 2b refers to the full sample and the two subgroups of *Clear* versus *Vague* disclosures.

**Figure 3: Market Response to Leading versus Lagging *Metaverse* Disclosures**

*Notes*: The Figure depicts a comparison CAAR between two types of disclosures, “Leading” and “Lagging,” as estimated using the market model. The total number of disclosures is 77. Leading disclosers are “Early Adopters” of Metaverse, representing the announcements of the first 42 Firms, and Lagging refers to Late Adopters of Metaverse disclosures, the remaining 35 firms. The date November 15 2021 is the determining point for the division of the two groups. There were six disclosures on this date; without knowing the exact hour of each disclosure, we could not separate the total disclosures into two identically sized groups. Therefore, we included all six disclosures on this date in the first Leading group (42) and the remaining disclosures in the Lagging group (35). The findings remained virtually the same when examining the sample without factoring in the six disclosures of November 15 2021.

**Figure 4: Market Response to *Metaverse* Disclosures – The Role of Size**

*Notes*: The Figure depicts the CAAR of firms according to their market capitalization. Two groups are defined: small-cap and large-cap firms, defined by their market capitalization 30 days prior to the *Metaverse* disclosure. As can be seen from the figure, it seems that big, rather than small, firms tend to be associated with greater CAAR across time. However, the abnormal returns are fully reversed 30 days after the disclosure for both groups, with the reversal proving more rapid for the group of firms.

**Table 1: Sample Characteristics**

Panel A lists the prevalence of *Clear* and *Vague* disclosures. 2022 refers only to January 2022, as the construction of the sample ended at the end of January 2022. Panel B shows the frequency of disclosures by the headquarters of the firms. There are total of 77 disclosures from 51 firms and 7 sectors.

|  |  |  |  |
| --- | --- | --- | --- |
| **Panel A: Disclosure Type** | | | |
| **Type** | **2021** | **2022** | **Total** |
| *Clear* Disclosures | 17 | 7 | 24 |
| *Vague* Disclosures | 45 | 8 | 53 |
|  |  |  |  |
| **Total Disclosures** | **62** | **15** | **77** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Panel B: Firms Headquarters and Sector Segmentation** | | | | |
| **Headquarters** |  |  | **Sector** |  |
| United States | 28 |  | Technology | 23 |
| China | 9 |  | Communication services | 13 |
| Hong Kong | 5 |  | Financial Service | 9 |
| Canada | 2 |  | Consumer cyclical | 2 |
| Cayman Islands | 1 |  | Consumer Defensive | 2 |
| Luxembourg | 1 |  | Industrials | 1 |
| Malta | 1 |  | Real Estate | 1 |
| South Korea | 1 |  |  |  |
| Switzerland | 1 |  |  |  |
| United Arab Emirates | 1 |  |  |  |
| United Kingdom | 1 |  |  |  |
| Total | 51 |  | Total | 51 |

**Table 2: Descriptive Statistics**

|  |  |  |  |
| --- | --- | --- | --- |
| **Firm Characteristics** | **Mean** | **Median** | **Std. Dev** |
| Total Assets (thousands of US $) | 11,200,383 | 75,105 | 50,889,527 |
| Market Capitalization (thousands of US $) | 79,634,616 | 241,787 | 368,085,989 |
| Share Price at t=-30 | 38.12 | 6.62 | 81.65 |
| Firm Sales Growth | 20.20% | 1.67% | 91.42% |
| Book to Market | 1.92 | 0.33 | 4.45 |
| Leverage | 2.21 | 0.66 | 2.90 |

*Notes*: The table describes the general descriptive statistics for the firms participating in the sample. Total assets are taken from the most recent year before the announcement. Following Cahill et al. (2020), market capitalization is calculated as the number of shares from the most recent quarter prior to the announcement, multiplied by the share price one month prior to the announcement. Following Klöckner et al. (2022), we calculate firm growth as the annual percentage change in total sales in the fiscal year prior to the announcement. Book-to-market ratio is the ratio of book value per share to the stock closing price at the announcement date, and firm leverage ratio is the ratio of total debt to total equity in the fiscal year prior to the announcement.

**Table 3: Market Response to *Metaverse* Disclosures**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Panel A: CAAR**  ***Market Model*** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full Sample | 0.77%  (0.41) | 0.33%  (0.32) | 2.50%  (2.12\*\*) | -3.58%  (-2.46\*\*) | -5.90%  (-3.00\*\*\*) | -9.13%  (-4.15\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Full excluding Repetitive Reports | -0.29%  (-0.12) | -0.83%  (-0.71) | 2.79%  (1.98\*) | -2.98%  (-1.75\*) | -5.04%  (-2.28\*\*) | -7.80%  (-3.63\*\*\*) |
| N | 51 | 51 | 51 | 51 | 51 | 51 |
| Full excluding Financial Reports | 1.93%  (0.71) | -0.08%  (-0.06) | 2.91%  (1.85\*) | -4.00%  (-2.23\*\*) | -6.12%  (-2.74\*\*\*) | -9.83%  (-3.76\*\*\*) |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Full excluding Repetitive and Financial Reports | 1.57%  (0.44) | -1.65%  (-1.29) | 4.00%  (2.18\*\*) | -3.75%  (-1.85\*) | -6.12%  (-2.41\*\*) | -8.97%  (-3.85\*\*\*) |
| N | 29 | 29 | 29 | 29 | 29 | 29 |
| Clear Plans | 0.26%  (0.06) | -1.86%  (-1.24) | 6.98%  (3.26\*\*\*) | -4.49%  (-1.75\*) | -7.36%  (-2.52\*\*) | -8.65%  (-2.81\*\*\*) |
| N | 24 | 24 | 24 | 24 | 24 | 24 |
| Vague Statements | 0.84%  (0.46) | 1.14%  (0.84) | 0.94%  (0.67) | -3.90%  (-2.15\*\*) | -6.19%  (-2.47\*\*) | -9.85%  (-3.43\*\*\*) |
| N | 53 | 53 | 53 | 53 | 53 | 53 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Panel B: CAAR**  **Market *Adjusted* Model** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full Sample | 3.20%  (1.71\*) | 1.32%  (1.25) | 3.11%  (2.64\*\*\*) | -1.28%  (-0.87) | -1.75%  (-0.87) | -2.74%  (-1.28) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Full excluding Repetitive Reports | 2.14%  (0.87) | 0.16%  (0.12) | 3.47%  (2.47\*\*) | -0.71%  (-0.41) | -1.13%  (-0.49) | -1.74%  (-0.79) |
| N | 51 | 51 | 51 | 51 | 51 | 51 |
| Full excluding Financial Reports | 4.23%  (1.60) | 0.74%  (0.55) | 3.60%  (2.29\*\*) | -1.52%  (-0.84) | -1.54%  (-0.64) | -2.87%  (-1.11) |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Full excluding Repetitive and Financial Reports | 3.74%  (1.06) | -0.88%  (-0.65) | 4.89%  (2.68\*\*) | -1.26%  (-0.59) | -1.73%  (-0.58) | -2.33%  (-0.88) |
| N | 29 | 29 | 29 | 29 | 29 | 29 |
| Clear Plans | 2.59%  (0.57) | -0.91%  (-0.56) | 7.72%  (3.63\*\*\*) | -2.19%  (-0.82) | -2.89%  (-0.86) | -2.15%  (-0.68) |
| N | 24 | 24 | 24 | 24 | 24 | 24 |
| Vague Statements | 3.27%  (1.83\*) | 2.12%  (1.56) | 1.48%  (1.06) | -1.66%  (-0.93) | -2.30%  (-0.94) | -3.71%  (-1.36) |
| N | 53 | 53 | 53 | 53 | 53 | 53 |

*Notes*: This table presents CAAR for selected time windows around the event as estimated by both the Market model and the Adjusted Market Model; t-test are in parentheses. \*\*\*, \*\*, and \* denote significance for 1%, 5%, and 10%, respectively, using two-tailed tests. For remaining definitions, please refer to Section 3.

**Table 4: Market Response to *Metaverse* Disclosures – Fama-French Three-Factor Model**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CAAR *FF3 factors Model*** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full Sample | 1.27%  (0.70) | 0.54%  (0.54) | 2.74%  (2.32\*\*) | -2.10%  (-1.49) | -3.61%  (-1.90\*) | -6.19%  (-3.09\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Full excluding Repetitive Reports | -0.03%  (-0.01) | -1.00%  (-0.94) | 2.87%  (2.05\*\*) | -1.58%  (-0.95) | -2.69%  (-1.24) | -4.96%  (-2.48\*\*) |
| N | 51 | 51 | 51 | 51 | 51 | 51 |
| Full excluding Financial Reports | 3.04%  (1.14) | 0.30%  (0.22) | 2.84%  (1.81\*) | -2.52%  (-1.43) | -3.88%  (-1.70\*) | -7.18%  (-2.87\*\*\*) |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Full excluding Repetitive and Financial Reports | 2.69%  (0.76) | -1.67%  (-1.37) | 3.76%  (2.06\*\*) | -2.44%  (-1.20) | -3.39%  (-1.25) | -6.30%  (-2.66\*\*) |
| N | 29 | 29 | 29 | 29 | 29 | 29 |
| Clear Plans | 0.94%  (0.21) | -2.07%  (-1.38) | 6.79%  (3.14\*\*\*) | -3.39%  (-1.33) | -5.48%  (-1.70\*) | -7.48%  (-2.50\*\*) |
| N | 24 | 24 | 24 | 24 | 24 | 24 |
| Vague Statements | 1.27%  (0.73) | 1.58%  (1.25) | 1.37%  (0.97) | -2.20%  (-1.27) | -3.93%  (-1.72\*) | -6.45%  (-2.53\*\*) |
| N | 53 | 53 | 53 | 53 | 53 | 53 |
| Full excluding Price<1$ | 1.67%  (0.90) | 0.66%  (0.64) | 3.26%  (2.56\*\*\*) | -1.47%  (-0.96) | -2.99%  (-1.45) | -6.53%  (-3.09\*\*\*) |
| N | 68 | 68 | 68 | 68 | 68 | 68 |

Notes: This table presents CAAR for selected time windows around the event according to the Fama-French (1993) three-factor model. t-test are in parentheses. \*\*\*, \*\*, and \* denote significance for 1%, 5%, and 10%, respectively, using two-tailed tests. For remaining definitions, please refer to Section 3.

**Table 5: Market Response to Leading Vs. Lagging *Metaverse* Disclosures**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Panel A:**  **Market Model** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 0.77%  (0.41) | 0.33%  (0.32) | 2.50% (2.12\*\*) | -3.58%  (-2.46\*\*) | -5.90%  (-3.00\*\*\*) | -9.13%  (-4.15\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Leading | 2.85%  (1.35) | 2.72%  (1.75\*) | 2.53%  (1.50) | -0.08%  (-0.04) | -3.37%  (-1.18) | -7.67%  (-2.50\*\*) |
| N | 42 | 42 | 42 | 42 | 42 | 42 |
| Lagging | -1.72%  (-0.54) | -2.53%  (-2.18\*\*) | 2.48%  (1.52) | -7.80%  (-3.88\*\*\*) | -8.94%  (-3.49\*\*\*) | -10.88%  (-3.49\*\*\*) |
| N | 35 | 35 | 35 | 35 | 35 | 35 |
| **Panel B:**  **Market Adjusted Model** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 3.20%  (1.71\*) | 1.32%  (1.25) | 3.11%  (2.64\*\*) | -1.28%  (-0.87) | -1.75%  (-0.87) | -2.74%  (-1.28) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Leading | 5.67%  (2.74\*\*\*) | 3.93%  (2.54\*\*) | 3.32%  (1.96\*) | 2.4%  (1.27) | 0.88%  (0.31) | -1.04%  (-0.35) |
| N | 42 | 42 | 42 | 42 | 42 | 42 |
| Lagging | 0.25%  (0.08) | -1.82%  (-1.48) | 2.86%  (1.78\*) | -5.71%  (-2.74\*\*\*) | -4.89%  (-1.80\*) | -4.77%  (-1.57) |
| N | 35 | 35 | 35 | 35 | 35 | 35 |
| **Panel C:**  ***FF3 factors Model*** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 1.27%  (0.70) | 0.54%  (0.54) | 2.74%  (2.32\*\*) | -2.10%  (-1.49) | -3.61%  (-1.90\*) | -6.19%  (-3.09\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Leading | 1.95%  (0.97) | 2.44%  (1.61) | 2.77%  (1.63) | 1.12%  (0.66) | -0.89%  (-0.35) | -4.58%  (-1.74\*) |
| N | 42 | 42 | 42 | 42 | 42 | 42 |
| Lagging | 0.46%  (0.14) | -1.74%  (-1.56) | 2.71%  (1.67\*) | -5.70%  (-2.63\*\*\*) | -6.86%  (-2.51\*\*\*) | -8.11%  (-2.67\*\*\*) |
| N | 35 | 35 | 35 | 35 | 35 | 35 |

Notes: The table presents the CAAR for two types of disclosures, “Leading” and “Lagging,” as estimated by the market model (Panel A), the market-adjusted model (Panel B), and the Fama-French 3-factors model (Panel C). The total number of disclosures is 77. Leading disclosures can be regarded as “Early Adopters” of *Metaverse*, while Lagging refers to “Late Adopters” of *Metaverse* disclosures. The division of the two groups is determined and constrained by the date of November 15 2021. There were six disclosures on this date, but without knowing the exact hour of each disclosure, we could not separate the total disclosures into two groups of identical size. Therefore, we included all six disclosures on this date in the first group of Leading disclosures, (42) and the remaining disclosures (35) in the Lagging group. The findings remained virtually the same when examining the sample without factoring in the six disclosures of November 15 2021. The t-tests are in parentheses. \*\*\*, \*\*, and \* denote significance for 1%, 5%, and 10%, respectively, using two-tailed tests.

**Table 6: Market Response to *Metaverse* Disclosures – The Role of Size**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Panel A:**  **Market Model** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 0.77%  (0.41) | 0.33%  (0.32) | 2.50%  (2.12\*\*) | -3.58%  (-2.46\*\*) | -5.90%  (-3.00\*\*\*) | -9.13%  (-4.15\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Small Firms | 1.06%  (0.31) | 0.73%  (0.44) | 1.89%  (1.17) | -6.21%  (-2.63\*\*) | -9.85%  (-3.08\*\*\*) | -11.35%  (-3.04\*\*\*) |
| N | 39 | 39 | 39 | 39 | 39 | 39 |
| Big Firms | 0.49%  (0.30) | -0.07%  (-0.05) | 3.13%  (1.82\*) | -0.90%  (-0.57) | -1.84%  (-0.89) | -6.85%  (-3.10\*\*\*) |
| N | 38 | 38 | 38 | 38 | 38 | 38 |
| **Panel B:**  **Market Adjusted Model** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 3.20%  (1.71\*) | 1.32%  (1.25) | 3.11%  (2.64\*\*) | -1.28%  (-0.87) | -1.75%  (-0.87) | -2.74%  (-1.28) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Small Firms | 3.12%  (0.92) | 1.46%  (0.86) | 2.43%  (1.51) | -3.77%  (-1.61) | -5.44%  (-1.66) | -5.00%  (-1.42) |
| N | 39 | 39 | 39 | 39 | 39 | 39 |
| Big Firms | 3.3%  (2.18\*\*) | 1.18%  (0.93) | 3.82%  (2.21\*\*) | 1.27%  (0.76) | 2.04%  (0.96) | 1.27%  (0.76) |
| N | 38 | 38 | 38 | 38 | 38 | 38 |
| **Panel C:**  ***FF3 factors Model*** | **[-7,-1]** | **[-3,-1]** | **[0,1]** | **[2,8]** | **[2,13]** | **[2,20]** |
| Full sample | 1.27%  (0.70) | 0.54%  (0.54) | 2.74%  (2.32\*\*) | -2.10%  (-1.49) | -3.61%  (-1.90\*) | -6.19%  (-3.09\*\*\*) |
| N | 77 | 77 | 77 | 77 | 77 | 77 |
| Small Firms | 2.27%  (0.68) | 0.96%  (0.59) | 1.86%  (1.15) | -4.26%  (-1.86\*) | -7.42%  (-2.38\*\*) | -8.31%  (-2.48\*\*) |
| N | 39 | 39 | 39 | 39 | 39 | 39 |
| Big Firms | 0.26%  (0.19) | 0.11%  (0.10) | 3.65%  (2.11\*\*) | 0.36%  (0.24) | 0.31%  (0.16) | -4.00%  (-1.90\*) |
| N | 38 | 38 | 38 | 38 | 38 | 38 |

Notes: The table presents the CAAR of two types of companies, “Small” and “Big” below and above the median of market capitalization (t-30). As the total number is odd, the final two groups include 39 small-cap and 38 large-cap firms. The CAAR is for selected time windows around the event. The t-test are in parentheses. \*\*\*, \*\*, and \* denote significance for 1%, 5%, and 10%, respectively, using two-tailed tests.

**Appendix A. Sample Construction**

|  |  |
| --- | --- |
| **Total Disclosures** | **382** |
| ***Excluding the two main conditions criteria:*** |  |
| 10-12B (Registration statement) EX-99.1 | 2 |
| 10-K (Annual report) | 2 |
| 10-Q (Quarterly report) | 5 |
| 13F-HR (Institutional investment manager holdings report) INFORMATION TABLE | 19 |
| 253G2 | 1 |
| 1-A (Offering statement) | 5 |
| 1-A POS (Post-qualification amendment) EX1A-13 TST WTRS | 13 |
| 1-U (Current report) | 3 |
| 20-F (Annual report - foreign issuer) | 5 |
| 424B2 (Prospectus) | 7 |
| 424B4 (Prospectus) | 3 |
| 425 (Prospectus/communication re business combination) (TRUSTS) | 18 |
| 485APOS (Prospectus materials) (TRUSTS | 64 |
| 485BXT (TRUSTS) | 3 |
| 497 (Prospectus) | 5 |
| 6-K (Current report) EX-99 | 4 |
| 8-A12B (Registration statement) | 3 |
| 8-K (Current report) | 14 |
| C (Offering statement) EX-99 | 10 |
| CERT | 3 |
| CORRESP (Correspondence) | 2 |
| D (Notice of sales of unregistered securities) | 13 |
| D/A (Notice of sales of unregistered securities) | 3 |
| DEFA14A (Proxy materials) | 7 |
| DOS PART II AND III | 3 |
| DRS (Draft registration statement) | 10 |
| F-1 (Registration statement) (TRUSTS) | 10 |
| N-CSR (Annual shareholder report) (Trusts) | 9 |
| NPORT-P (Trusts) | 6 |
| N-PX (Annual proxy voting report) | 1 |
| S-1 (Registration statement) | 15 |
| **Total** | **268** |
| ***Excluding*** Duplicate and Parallel disclosures within a range of 5 days | 29 |
| ***Excluding*** OTC Stocks | 8 |
|  |  |
| **Final Sample** | **77** |

*Notes*: To construct the final sample, we utilized the following screening procedure. First, we excluded search results of firms that do not meet our two main conditions detailed in Section 3. i.e., disclosures for firms that are not traded yet (e.g., registration statements and draft registration statements) and having just a general indication of the word *Metaverse*. Second, duplicate or parallel disclosures are removed within a range of 5 days, focusing on the first disclosure. Third, we excluded disclosures of OTC stocks. The procedure leaves uswith 77 disclosures from 51 firms.

**Appendix B. *Clear* and *Vague* Disclosures List**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Panel A: *Clear* Disclosures** | | |  |  |
| **Firm** | **Ticker** | **Date** | **Firm** | **Ticker** | **Date** |
| NextPlay Technologies Inc. | NXTP | 23/08/2021 | Aries I Acquisition Corp. | RAM | 13/12/2021 |
| Scienjoy Holding Corp | SJ | 29/09/2021 | Meten Holding Group Ltd. | METX | 22/12/2021 |
| The 9 LTD | NCTY | 30/09/2021 | Seachange International Inc | SEAC | 22/12/2021 |
| Super League Gaming, Inc | SLGG | 07/10/2021 | Scienjoy Holding Corp | SJ | 29/12/2021 |
| Esports Entertainment, Inc. | GMBL | 13/10/2021 | DoubleDown Interactive Co., Ltd. | DDI | 13/01/2022 |
| B. Riley Principal 150 Merger | BRPM | 25/10/2021 | NextPlay Technologies Inc. | NXTP | 13/01/2022 |
| Agm Group Holdings, Inc. | AGMH | 26/10/2021 | Activision Blizzard, Inc. | ATVI | 18/01/2022 |
| Unity Software Inc. | U | 09/11/2021 | DatChat, Inc. | DATS | 18/01/2022 |
| Glimpse Group, Inc | VRAR | 10/11/2021 | Microsoft Corp | MSFT | 18/01/2022 |
| Glimpse Group, Inc. | VRAR | 22/11/2021 | AMTD International Inc. | HKIB | 20/01/2022 |
| CooTek (Cayman)Inc. | CTK | 08/12/2021 | BTCS Inc. | BTCS | 24/01/2022 |
| Aerocentury Corp | ACY | 10/12/2021 | Sports Ventures Acquisition Corp. | AKIC | 25/01/2022 |
| **Panel B: *Vague* Disclosures** | | | | | |
| **Firm** | **Ticker** | **Date** | **Firm** | **Ticker** | **Date** |
| Roblox Corp | RBLX | 16/04/2021 | CEVA INC | CEVA | 09/11/2021 |
| Unity Software Inc. | U | 11/05/2021 | Veritone, Inc. | VERI | 09/11/2021 |
| Roblox Corp | RBLX | 13/05/2021 | Enthusiast Gaming Holdings Inc. | EGLX | 10/11/2021 |
| Agora, Inc. | API | 24/05/2021 | Playstudios, Inc. | MYPS | 10/11/2021 |
| Roblox Corp | RBLX | 10/06/2021 | Scienjoy Holding Corp | SJ | 10/11/2021 |
| Facebook Inc | FB | 28/07/2021 | Agora, Inc. | API | 15/11/2021 |
| Corsair Gaming, Inc. | CRSR | 03/08/2021 | B. Riley Principal 150 Merger Corp. | BRPM | 15/11/2021 |
| Unity Software Inc. | U | 10/08/2021 | EXP World Holdings, Inc. | EXPI | 15/11/2021 |
| Roblox Corp | RBLX | 16/08/2021 | Glimpse Group, Inc. | VRAR | 15/11/2021 |
| Nvidia Corp | NVDA | 18/08/2021 | Remark Holdings, Inc. | MARK | 15/11/2021 |
| 9F Inc. | JFU | 30/08/2021 | Super League Gaming, Inc | SLGG | 15/11/2021 |
| Glimpse Group, Inc | VRAR | 28/09/2021 | BIT Mining Ltd | BTCM | 18/11/2021 |
| Lion Group Holding Ltd | LGHL | 30/09/2021 | Globant S.A. | GLOB | 18/11/2021 |
| Lion Group Holding Ltd | LGHL | 07/10/2021 | Scienjoy Holding Corp | SJ | 22/11/2021 |
| Interpublic Group Inc. | IPG | 21/10/2021 | dMY Technology Group, Inc. | DMYQ | 29/11/2021 |
| Facebook Inc | FB | 25/10/2021 | Wisekey International Holding S.A. | WKEY | 01/12/2021 |
| Color Star Technology Co., Ltd. | CSCW | 02/11/2021 | Color Star Technology Co., Ltd. | CSCW | 02/12/2021 |
| Kopin Corp | KOPN | 02/11/2021 | Enthusiast Gaming Holdings Inc. | EGLX | 02/12/2021 |
| Match Group, Inc. | MTCH | 02/11/2021 | Takung Art Co., Ltd | TKAT | 03/12/2021 |
| Enthusiast Gaming Holdings Inc. | EGLX | 04/11/2021 | Remark Holdings, Inc | MARK | 06/12/2021 |
| Roblox Corp | RBLX | 08/11/2021 | Skillful Craftsman Education Ltd | EDTK | 06/12/2021 |
| Yalla Group Ltd | YALA | 08/11/2021 |  |  |  |

*Notes*: The Appendix shows the total sample of disclosures extracted from the SEC website, with the distinction between Clear and Vague Disclosures. “Clear” refers to de facto new plans for partnerships or actual investments in firms with Metaverse platforms through mergers, acquisitions, launching new initiatives or applications, enhancing, or adding Metaverse features to their platforms. “Vague” includes vague declarations describing future possible opportunities or firms’ plans about developing certain technologies, or general statements of intentions.

**Appendix C. *Clear* and *Vague* Examples**

**Examples for “*****Clear*”**

“*Clear”* disclosures involve d*e facto new plans for partnerships or actual investments in firms with Metaverse platforms through mergers, acquisitions, launching new initiatives or applications, enhancing, or adding Metaverse features to their platforms*

**NextPlay Technologies Inc. 23/08/2021**

“….NextPlay co-CEO Nithinan ‘Jessie’ Boonyawattanapisut, commented, **“**We believe that the addition of Make It Games technology and its leadership will help accelerate our global initiatives and transform NextPlay into a powerhouse in online advertising, interactive digital media, gaming, fintech and travel, and serve as a **bridge for us to expand into the metaverse**.They are expected to greatly augment our growing global technology group that is focused on developing and implementing innovative consumer-engaging assets across multiple media channels.”

**Scienjoy Holding Corp - 29/09/2021**

**“Scienjoy to Initiate Metaverse Project Based on Its Virtual Worlds Platform**

BEIJING, Sept. 29, 2021 /PRNewswire/ -- Scienjoy Holding Corporation (“Scienjoy”, the “Company”, or “We”) (Nasdaq: SJ), a leading live entertainment mobile streaming platform in China, today announced that Scienjoy expects to incorporate the Company’s technologies in Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), and Non-Fungible Tokens to **expand to the metaverse project**. Metaverse is a concept of a future iteration of the internet where people work, play, and socialize, made up of persistent, shared, 3D virtual spaces linked into a perceived virtual universe. The Company has applied its technologies to the six compelling complete virtual reality worlds in the Company’s show live streaming platforms. Through initiating the metaverse project, the Company expects to consolidate its significant edges in the mobile live streaming market and establish an advanced metaverse ecosystem.”

**Examples for** **“*Vague*”**

*Vague disclosures* *include vague declarations describing future possible opportunities or firms’ plans about developing certain technologies or allocate resources for R&D, or general statements of intentions, involvement or capabilities.*

**Roblox Corp – 16/04/2021**

“…Gina Mastantuono is an eminent finance authority, and her global experience is a great enhancement to the Board’s perspective,” said David Baszucki, CEO of Roblox. “As a public company, having Gina’s technical financial expertise, as well as her sharp strategic skills and integrity related to risk oversight will be invaluable as she chairs the Audit Committee.”

“I am honored to join Roblox, a pioneer in enabling shared experiences online and in virtual worlds. Roblox is building the metaverse, enabling people around the world to play, work, learn, and socialize together in a way that simulates the real world,” said Gina Mastantuono. “I am excited to join Roblox’s board in helping to bring this vision to life.”

**Unity Software Inc. - 11/05/2021**

“Unity is the world’s leading platform for creating and operating interactive, real-time 3D (RT3D) content. With Unity, creators have the tools to become RT3D creators. Creators, ranging from game developers to artists, architects, automotive designers, filmmakers and others, use Unity to make their creative vision come to life. With this broad approach, we believe the opportunity to create and operate rich and immersive experiences is almost limitless, setting up Unity to not only anchor tomorrow’s most advanced applications but to enable and power the metaverse at the most foundational level.”

1. The report published in March 2022 (Accessed on 03, March 2022):

   [Metaverse and Money: Decrypting the Future (citi.com)](https://ir.citi.com/gps/BGrBay2thaQaH9HYofo3Uf3ThNldHDse_iJbe_md8Xk2SX5N3rdCq70nBWVa5mRqVYO3BHcw4Htuf7ihwIzrP6f0AN2kKVQZ) [↑](#footnote-ref-1)
2. Notably, we kept only the first disclosure in cases where a certain firm releases several disclosures in a relatively short period of five days. Disclosures of firms in period larger than five days *("Repetitive"*) are left in the Full sample but are excluded in our second definition of the sample ("*Full Sample excluding Repetitive*"), as explained subsequently. [↑](#footnote-ref-2)
3. https://finance.yahoo.com/ [↑](#footnote-ref-3)
4. For a full explanation of the process please refer to the notes in Table 5. [↑](#footnote-ref-4)