

Please quote as: Tingelhoff, F., Valentino, J. & Zierau, N. (2024). Metaverse Offerings and Their Impact on Stock Returns: Evidence from an Event Study. Americas Conference on Information Systems (AMICS) (p./pp. 1-10), Salt Lake City, USA.

Metaverse Offerings and Their Impact on Stock Returns: Evidence from an Event Study

Completed Research Full Paper

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Abstract

The metaverse represents a novel customer channel that disrupts business models and operations. This creates a variety of questions to managers and researchers, such as whether and when the addition of this new customer channel creates value for firms. This study uses event study methodology to examine the impact of 508 metaverse announcements on the stock market returns of 65 publicly traded firms across six industries. It also explores the moderating effect of different types of metaverse offerings. As research on metaverse benefits from an investors' perspective is scarce, this study provides insight into investors' perceptions of metaverse value propositions to firms. The study considers how certain offerings may utilize or be constrained by metaverse technologies, indicated by investor evaluations. It proposes important future research directions to understand metaverse implications for firms, preparing for the rapidly changing channel that will likely impact business models and operations in the coming years.

Keywords

Metaverse, Customer Channel, Innovation Management, Event Study.

Introduction

Technological advancements often disrupt existing business operations by introducing new and better customer channels. Currently, a cutting-edge technological revolution offering new possibilities to the business world is the metaverse. The metaverse can be defined a digital space that revolutionizes how users and businesses interact to generate value (Buhalis et al. 2023). It leverages new technologies (e.g., virtual and augmented reality) to provide distinct features that firms can use to build unique user experiences (Hadi et al. 2023). For instance, metaverses allow users to experience products as it would not be possible in real life – like driving a BMW-car on the moon, or playing soccer in a hyper-sized pinball machine.

Indeed, the possibilities of the metaverse have gained widespread attention in the business world, with various industries and investors captivated by its transformative potential and the myriad opportunities it presents for merging the physical and digital worlds (Gartner 2022). Some market experts expect the metaverse market to be worth \$13 trillion by 2030 (City Bank 2022). This has inspired many firms to invest great sums into metaverse offerings. For instance, tech giants such as Google, Microsoft, and, most famously, Meta alone have invested billions of dollars into metaverse technologies, including hardware, software, and infrastructure (Hadi et al. 2023). However, despite firms' growing expenditure in the area, the effect of the metaverse on firm value remains unclear.

Introducing a novel customer channel naturally disrupts many firms' business models and operations. This creates a variety of questions for managers and researchers, such as whether to invest in a new channel and

which kind of use cases to implement. Hence, a perennial research question is *whether and when adding the metaverse as a new customer channel creates value for firms*. Extant literature has investigated this question in the context of internet channels (Geyskens et al. 2002), mobile apps (Boyd et al. 2019), and conversational AI (Fotheringham and Wiles 2022). Since the metaverse is a fundamentally novel customer channel revolutionizing virtual customer-firm interactions (Yoo et al. 2023), this question must also be answered for metaverse-based customer offerings. To do so, we apply the event study methodology to examine the impact of 508 metaverse announcements on the stock market returns of 65 publicly traded firms from six industries. Following Tingelhoff et al. (2024), we further identify which type of metaverse offerings moderates the impact of a firm's metaverse announcement on firm value.

Our work makes two primary contributions to the literature on implementing and evaluating emerging technologies in customer channels. First, we contribute to the emerging research field on the metaverse (e.g., Hadi et al. 2023). Only a few studies have investigated the business potential of metaverse technologies. Extant research has focused on the (1) customer perspective and (2) specific metaverse use cases. Research on the benefits of the metaverse holistically from the investors' point of view is still underrepresented. Complementing Hadi et al. (2023), who derive different benefits metaverse technologies can provide to customers and firms from extant literature, we empirically verify whether investors recognize these benefits. We find that the effect of a metaverse announcement on the firm value is positive – a .78% increase on average when a firm announces its metaverse participation. Second, our analysis shows what types of metaverse offerings investors view favorably. Following Yoo et al. (2023), we propose that specific offerings may utilize or be constrained by current technologies' maturity, which may lead investors to evaluate metaverse announcements differentially. Our empirical analysis finds that investors especially value when organizations deploy offerings that utilize metaverses as a customer channel and complement transactional and e-commerce functions. Contrarily, engagement-based metaverse offerings (e.g., educational activities) do not affect a firm's valuation, as the metaverse's current technological maturity likely limits their customer benefits.

How the Metaverse Impacts Customer-Brand Relationships

Though the emergent nature of metaverses has resulted in its inconsistent conceptualization (Dwivedi et al. 2022), most researchers agree that it represents a novel customer channel that fundamentally impacts customer experiences and, in turn, firm outcomes (Hadi et al. 2023; Yoo et al. 2023). In this context, Hadi et al. (2023) assumed a consumer behavior perspective to showcase how the metaverse impacts user-brand interactions. They define the metaverse as a “network of digitally mediated spaces that immerse users in shared, real-time experiences” (p. 5) and derive five key characteristics for the metaverse: (1) digital mediation, (2) spatiality, (3) immersion, (4) community, and (5) instantaneity. While each characteristic already exists on other platforms, their combination uniquely impacts a customer's virtual identity, social experience, and perceived ownership in online environments, unparalleled to any prior customer channel.

Extending the perspective of the metaverse as a customer channel, Yoo et al. (2023) conceptualized how the metaverse impacts an organization's customer touchpoints. They find that the unique characteristics of the metaverse establish and reshape customer-brand interactions in three ways: (1) through new means of virtual commerce, (2) by offering new ways of virtual collaboration and value co-creation, and (3) by engaging customers with the brand through new kinds of interactive environments. First, although other digital environments enable e-commerce opportunities, the metaverse offers a new depth of economic systems. These build on unique digital assets and deterministic legal ownership (facilitated by decentralized ledger technologies such as Blockchains), as well as digital personas in the form of avatars to allow for direct peer-to-peer transactions of value items (Tapscott and Tapscott 2017). Combined with new immersive technologies, the metaverse can evolve virtual e-commerce through new opportunities along the value exploration, exchange, and evaluation to create new retail opportunities (Yoo et al. 2023). Second, the metaverse enables a more profound depth of consumer relationships in the metaverse compared to other digital customer channels. The metaverse's spatiality and instantaneity foster the creation of localized communities (Hadi et al. 2023). Furthermore, immersion and interaction through digital personas enable users to express themselves more naturally, leading to more realistic social feedback and, in turn, more profound customer-brand relationships (Yoo et al. 2023). As consumers are empowered to develop, validate, and maintain social relationships within the same digital platform where they conduct business, the metaverse offers new opportunities for retailers and marketers to exploit the depth and breadth of

customer-brand relationships. Third, the metaverse offers novel ways for consumers to interact with their virtual environments. Through augmented and virtual reality, consumers can experience brand offerings in much greater detail and variety, which leads to higher customer engagement. Retailers can utilize these characteristics in their product creation and delivery to create unique customer experiences that result in closer psychological connections with their customers.

Hypothesis Development and Conceptual Framework

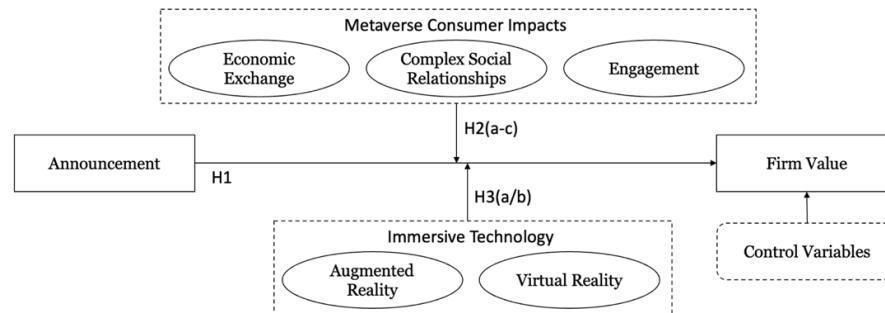


Figure 1. Conceptual Framework

The conceptual framework with hypotheses H1 through H3 is presented in Figure 1. The primary focus of this study is on the direct relationship between a metaverse *Announcement* of a firm and the underlying *Firm Value*, as represented by the squared outline and H1. The oval shapes in the framework correspond to moderating effects, which include the three metaverse customer impacts (see H2a-c) and the immersive technologies that the announcements utilize (i.e., virtual and augmented reality; see H3a/b). Additionally, *Control Variables* (e.g., the announcement's timing) are included that might affect Firm Value but are not directly linked to the primary or moderating effects.

By announcing a metaverse experience, a firm can send two essential signals to investors. Firstly, it indicates the firm's ability to innovate and adapt to new technologies, which can positively impact its perceived agility and innovation propensities (Kalaigianam et al. 2021). Secondly, it suggests the firm's strategic interest in exploring new ways to engage with customers and bring innovative solutions to the market (Boyd et al. 2019; Di Gangi et al. 2010). In today's technology-driven, fast-paced business environment, it is crucial to respond to disruptive innovations and technology adoption to adeptly navigate environmental dynamism to respond to changes in the market. Past research has argued that the metaverse uniquely enhances customer-brand relationships (Yoo et al. 2023), influences consumer behavior (Hadi et al. 2023), and appreciates value perceptions for businesses and users (Schöbel & Tingelhoff, 2023). As investors gather new information about a firm's activities, they update their expectations, which can affect its stock market reactions and, ultimately, its value (Grossman 1981). Accordingly, we posit:

H1 A firm's metaverse announcement positively affects firm value.

Adding a new customer channel that offers unique value benefits has the potential to strengthen customer-firm relationships and increase customer satisfaction and loyalty, which ultimately has been shown to enhance shareholder value in multiple contexts (e.g., Boyd et al. 2019; Fotheringham and Wiles 2022). Specifically, metaverse offerings can positively impact consumer behavior as their underlying technologies (such as Blockchain technology or digital avatars) allow for the direct and convenient purchase of digital and physical products (Yoo et al. 2023). Furthermore, digital assets integrated into decentralized ledger technologies, also called non-fungible tokens (NFT), constitute a new, synergetic product category that retailers can utilize. For example, many practitioners recognize a trend that young people predominantly buy clothing items to display them on their social media posts (Paton et al. 2019). Nike, in response, has introduced bundles, where users can buy identical shoes as a physical product and NFT, to empower users to portray a consistent image along all their social platforms, photo or avatar driven (Bhasin 2022). Given the unique metaverse benefits to value exploration, creation, and delivery, we expect that metaverse offerings based on economic exchange will positively influence shareholder value. Thus, we posit:

H2a Metaverse announcements focused on *economic exchange* by a firm positively moderate the effect of the announcement on firm value.

In addition to the anticipated revenues derived from the unique value benefits of metaverse offerings, the metaverse supports new ways to enhance social interaction between customers and brands, but also between customers. In the case of the former, this can lead to customer-brand co-creations that result in financial benefits for firms. For example, the hotel chain Starwood Hotels tests their hotel designs in the metaverse with customers before constructing their buildings. They can save substantial costs for physical re-designs and ensure customer satisfaction. In the case of the latter, new customer communities can emerge in which users can interact based on their preferences and experiences. The emergence of these online communities can result in customers acting as non-employed sales agents, which again benefits the corporations. Ultimately, the metaverse's focus on the immersive social exchange of customers with other entities can financially benefit the organization, positively influencing shareholder value. Thus, we posit:

H2b Metaverse announcements focused on *complex social relationships* by a firm positively moderate the effect of the announcement on firm value.

A third way metaverse offerings may provide customer value is through enhanced customer engagement. This is defined as the degree to which firms can create customer experiences that evoke emotional involvement with the firm or with other customers of the firm (Schöbel and Tingelhoff 2023). Metaverse experiences are characterized by rich simulations through multiple sensory modalities covering visual, auditory, and sometimes even haptic cues (Hadi et al. 2023). For instance, metaverse offerings allow users to hear ambient sounds, the voices of other people, and even self-produced sounds (e.g., one's footsteps), which have been shown to increase immersion in a shopping experience (Dwivedi et al. 2022). Additionally, the metaverse enables new kinds of customer-environment interactions. Such metaverse offerings rely on an entirely synthetic and digitally mediated environment resembling an immersive representation of the physical world while not restricting consumers to physical laws and actual geographic locations (Hadi et al. 2023). This allows a new kind of digitally mediated customer experience, where customers can perceive and test products more tangibly, almost like a physical store. Aided by immersive technologies (such as virtual or augmented reality), immersed customers are more engaged and aroused when gathering experiences in the virtual environment, which can result in deeper customer-brand relationships (Yoo et al. 2023). Specifically, metaverse offerings allow additional tangible and intangible value tie-ins that create a multifaceted and emotionally stimulating customer experience (Hadi et al. 2023). Thus, we posit:

H2c Metaverse announcements focused on *engagement* by a firm positively moderate the effect of the announcement on firm value.

A central and unique aspect of metaverses is their users' immersion in the digital environment (Dwivedi et al. 2022). Through immersive technologies, most prominently virtual and augmented reality, users can experience overlays of complementary digital information onto their physical environment or immerse in entirely virtual environments. Many large and influential companies constantly advance and improve these emergent technologies. For example, Apple announced their upcoming Apple Vision headset, which first professional reviewers described as "the closest thing a technology ever felt to being magic" (Tingelhoff et al. 2024). Moreover, Meta (formerly Facebook) collaborates with Ray Ban to launch augmented reality glasses that use artificial intelligence to visually superimpose digital information onto the viewer's physical surroundings to complement his experience. This can result in enhanced experiences of manifold user interactions with their environment and other people. Thus, we posit:

H3a Metaverse announcements based on *augmented reality (AR)* by a firm positively moderate the effect of the announcement on firm value.

H3b Metaverse announcements based on *virtual reality (VR)* by a firm positively moderate the effect of the announcement on firm value.

Methodology

To test our hypotheses, we rely on an event study. An event study is considered a fitting methodology for analyzing firm performance over time as it examines the behavior of firms' stock prices concerning firm events and information release (Kothari and Warner 2007). Specifically, event studies are used to assess the impact of publicly disclosed managerial IT decision-making of publicly traded firms. For instance, similar studies examined the effects of announcements of voice assistants (Bahmani et al. 2022), chatbots (Fotheringham and Wiles 2022), and internet channel addition (Geyskens et al. 2002).

Data Collection

In our application of event study methodology, the metaverse announcements are conceptualized as a quasi-independent variable. They serve as a temporal indicator rather than a manipulable factor, delineating the occurrence of an event whose impact on stock returns is quantitatively assessed against a predetermined normative baseline. This approach allows for the inference of the announcement's effect through observed aberrations from expected return trajectories, thereby establishing its role as an independent variable within this analytical framework.

We employed a two-step approach to finding relevant firms and respective announcements for the study. First, we selected appropriate firms by systematically searching four indices: the Bloomberg Metaverse Competitive Landscape (Bloomberg Intelligence 2021), the Roundhill Ball Metaverse ETF (Roundhill Investments 2022), the S&P 500, and the NASDAQ 100. We reviewed each firm listed in the respective indices individually. We included 65 firms from six industries and four countries of origin. In a second step, we gathered the announcements of each firm by manually searching investor relations and newsroom websites, as well as the LexisNexis business news database. In addition, we conducted a Google search to identify further relevant announcements outside the respective databases. To account for the metaverse's evolving nature and meaning (Peukert et al. 2022), we excluded announcements from before 2018, when the movie *Ready Player One* launched, visualizing the metaverse's idea and potential for the first time. We based our data collection on the following inclusion criteria:

- The firm publicly posted at least two announcements related to metaverse experiences on its investor relations or newsroom website.
- The announcement includes a value proposition intended for the end user. Firms that manufacture hardware or infrastructure exclusively, such as semiconductors or HMDs, were excluded.
- The firm trades on the US stock market.

To control for confounding factors, we omitted announcements made close to firms' earnings releases (Sorescu et al. 2017). Furthermore, no discrimination was made in the selection of announcements. If the announcement could be placed within the outlined technology classification and definitions, we included it in the study – regardless of its perceived importance or scope. We chose this approach to avoid selection bias and to follow the given systematic approach. The final dataset consists of 508 announcements; the sample size exceeds similar studies (e.g., Bahmani et al. (2022) with 96 or Fotheringham and Wiles (2022) with 153).

Dependent Variable

The contemporary financial theory states that a firm's current stock price is the discounted value of predicted net cash flows that are expected to be accumulated by the firm (Rappaport 1987). Thus, the present value of a firm's stock is determined based on the estimated future value and fluctuates depending on investors' opinions. The measurable effect following an information release or public announcement is referred to as the abnormal return (AR). The AR is computed by subtracting the observed return of the reference market (R_{mt}) on the day (t) from the actual return (R_{it}) of the observation (i) on that day (Corrado 2011). We can formally model the daily AR with the following equation:

$$AR_{it} = R_{it} - R_{mt}$$

To estimate the returns, we utilized the Fama-French 3-Factor model (Fama and French 1993). This return model is suitable for short-term event studies, as Sorescu et al. (2017) demonstrated. We calculated expected returns for a 250-trading day period as it reflects the approximate number of trading days in a calendar and follows best-practice recommendations (Corrado 2011). The abnormal return reflects unanticipated profits or losses a stock generates on a given day. However, it only measures the impact of information released on a single day and is not a sufficient indicator for assessing the total impact of the information contained in an announcement (Tellis and Johnson 2007). This comes as information can either be leaked before or processed after the event day (McWilliams and Siegel 1997). Thus, the cumulative abnormal return (CAR) is a better indicator to measure the total impact of information release and adequately assess the significance of an announcement. It is the sum of all abnormal returns over a set event window of interest, formally modeled as follows:

$$CAR(t_1, t_2) = \sum_{t_2}^{t_1} AR_{i,t}$$

The model depicts the AR of a stock on a given day (t), calculated around a retrospective and forward-looking event window starting at $t_1 = (-x)$ and ending at $t_2 = (y)$, whereby $-x$ represents the defined number of days before the event and y represents the number of days after the event (Tellis and Johnson 2007). The event window can be chosen as desired and as short as three days total or range up to 100 days or more (McWilliams and Siegel 1997). An event window exceeding the announcement day permits examining influencing effects surrounding the event (MacKinlay 1997). For example, nowadays, information is often leaked, or the market thoroughly analyzes a company's behavior to anticipate its next moves by monitoring announcements and activities leading up to an event. To define the event window, we conducted the event study with multiple event windows ranging from $(-10,10)$ to $(-1,1)$. We compared the significance of each event window range with the standardized cross-sectional test (Boehmer et al. 1991). We identified the event window $(-5,5)$ as the most significant.

Moderating Variables

Within the confines of this study, moderators are defined as variables that modulate the extent of market reaction to the announcement, rather than altering the causal dynamics between conventional independent and dependent variables. These moderators serve as critical analytical tools to dissect the heterogeneity of market responses, elucidating how various attributes of the announcement, such as the nature of the value discussed, differentially influence the market's appraisal and subsequent reflection in stock return deviations. We derived the moderating variables from two sources: metaverse announcements and Compustat. First, we manually reviewed the content of each announcement according to the definitions described in the literature review. We read each announcement individually and categorized it into one or more metaverse customer impacts: *Economic Exchange*, *Customer-Brand Social Relationships*, and *User Engagement*. We assigned a value of 1 if the announcement discussed a respective metaverse customer impact and 0 if it was not addressed. Moderating variables are not mutually exclusive, as firms could target multiple customer impacts within the same metaverse offering, leading to possible interactions between the customer impacts. Further, the moderating variables *Augmented Reality (AR)* and *Virtual Reality (VR)* describe whether an announcement mentions explicitly that the offering is based on the respective technological capability (1) or not (0).

Control Variables

Following prior event studies, we included additional factors affecting returns as control variables. The *Time Period* variable considers timing effects, as monolithic events such as shifts in market opinion, market-entry, or another temporal caesura may affect market perceptions of announcements (Brown and Lattin 1994). In this regard, the temporal caesura caused by the announcement of Facebook's transition to Meta on 28.10.2021 was most influential. The *Time Period* represents a grouping dummy variable to delineate if an announcement was made before (0) or after (1) Facebook's rebranding. For controls at the firm level, we incorporated the *Firm Size* as the natural logarithm of a firm's total assets with data gathered from Compustat (Bahmani et al. 2022). We gathered the *Metaverse Customer Impact* data from Compustat to follow current research standards. *Prior Performance* controls for event occurrences caused by extreme economic performance or contrarian investment strategies (Kothari and Warner 2007). We gathered the data from Compustat and calculated it as follows: $\text{net income}_{t-1} / \text{total assets}_{t-1}$ (Fotheringham and Wiles 2022). Additionally, we coded the control variable *Innovation Capacity*, assigning 1 if the announcement discussed an investment significantly impacting the firm's business model, and 0 if it was a fringe investment. Lastly, at the industry level, the *Competitive Intensity* control represents the inverse Herfindahl-Hirschman index (HHI) for prevailing industry concentration (Homburg et al. 2014). We gathered the HHI data from Compustat as it accounts for the number of firms in a market and industry concentration by considering the relative size of all competitors in the market in relation to their market share (Rhoades 1993).

Correlation and Descriptive Statistics

The correlations for all independent variables indicate that weak negative correlations exist, most extremely pronounced between Firm Size and Prior Performance ($r = .37$). No correlation is strong enough to violate the assumption of multi-collinearity. However, Augmented Reality and Virtual Reality highly correlate ($r = -.74$), approaching the threshold that signifies a high chance of multi-collinearity at 0.8. Hence, to ensure that all independent variables can be utilized in the regression model, we calculated the variance influence factors (VIFs) of all independent variables. All VIFs lie far below the threshold of 10 (Hair et al., 2019), with AR and VR being the highest (2.231 and 2.238, respectively). Thus, we can assume that there is no multi-collinearity between our variables and that all variables can be used in our regression model. The correlation table and the variance influence factors can be provided upon request.

We use the linear regression model provided below to assess the effect of a specific announcement j on the abnormal stock return i of a particular firm, including the outlined independent variables expected to influence the abnormal stock return of the firm and the outlined control variables accounting for other factors that might affect the abnormal stock return of the firm.

$$CAR_i = \beta_0 + \beta_1 EconomicExchange_{j,i} + \beta_2 CustomerBrandRelationships_{j,i} + \beta_3 UserEngagement_{j,i} + (\beta_4 AugmentedReality_{j,i} * \beta_5 VirtualReality_{j,i}) + \beta_{6-11} Controls + \varepsilon_i$$

Results

Variable	Model 1 Estimate (SE)	Model 2 Estimate (SE)	Model 3 Estimate (SE)	Model 4 Estimate (SE)
Intercept	.004 (.034)	.117*** (.039)	.064** (.026)	.082* (.042)
<i>Moderating Variables</i>				
Economic Exchange	.017* (.009)	-	.017** (.008)	.018** (.009)
Customer-Brand Relationships	.024** (.011)	-	.027** (.010)	.023** (.011)
User Engagement	.015 (.009)	-	.013 (.009)	.013 (.009)
Augmented Reality (AR)	-	-.077*** (.024)	-.079*** (.024)	-.076*** (.025)
Virtual Reality (VR)	-	-.076*** (.024)	-.077*** (.024)	-.076*** (.024)
Augmented AND Virtual Reality	-	.076*** (.027)	.076*** (.027)	.073*** (.027)
<i>Control Variables</i>				
Time Period	.015** (.007)	.015** (.007)	-	.013* (.007)
Innovation-Level	-.000 (.008)	-.000 (.008)	-	-.003 (.008)
Firm Size	-.001 (.002)	-.002 (.002)	-	.015 (.010)
Prior Performance	.005 (.016)	.004 (.017)	-	-.001 (.002)
Offering Type	.015 (.010)	.011 (.009)	-	.003 (.017)
Competitive Intensity	-.005 (.016)	-.003 (.002)	-	-.003 (.002)
<i>Descriptive Statistics</i>				
F-statistic	1.738*	2.127**	3.211**	2.165**
R-squared (adj R-squared)	.031 (.013)	.027 (.020)	.037 (.026)	.050 (.027)
Observations	508	508	508	508
*p value < .10; **p value < .05; ***p value < .01; Confidence intervals according to leading event study literature (e.g., see Bahmani et al. 2022; Fotheringham and Wiles 2022); Observations: 508				

Table 1. Results Fama-French 3 Factor Model (Models 1-4)

We ran several alternative models and presented the results in Table 1. The results show that Model 4 has the highest R-square, indicating that it explains the largest proportion of the variance in the dependent variable. As a result, the following discussion will focus solely on the findings from Model 4. Furthermore, the F-statistic for Model 4 is statistically significant, which implies that at least one of the independent variables in the model significantly relates to the dependent variable. This rejects the null hypothesis that all regression coefficients are zero and suggests that the independent variables in Model 4 contribute significantly to predicting the dependent variable.

The primary focus of this study is to examine the direct relationship between metaverse announcements by a firm and its underlying firm value. We hypothesized that metaverse announcements by a firm could have a positive effect on the firm's valuation. To test this hypothesis, we used a multiple regression analysis. The results indicate that the main effect, represented by the intercept of the model, is significant ($p = .051$). This finding supports hypothesis H1, which suggests that when a firm announces its metaverse participation, it can positively impact underlying firm value. We conducted the analysis within the most significant event window of ten days around the event date (-5,5) (Boehmer et al. 1991). Results show that firms in the dataset experienced an average abnormal return (CAAR) increase of 0.88% within the event window. This increase is comparable to the effects of announcements about internet channel addition (0.71% in Geyskens et al. 2002) but greater than those seen after a voice assistant announcement (0.32% in Bahmani et al. 2022). Multiplying the CAAR by the average market value of firms in the dataset, as retrieved from Compustat, yields an average increase in firm value of \$2002.29 million when a firm announces its metaverse participation to the public.

We hypothesized that referring to specific metaverse customer impact such as *Economic Exchange*, *Complex Social Relationships*, and *User Engagement* can positively moderate firm announcements (H2a-c). Our analysis partially supports these hypotheses. Specifically, mentioning *Economic Exchange* and *Customer-Brand Relationships* result in a higher abnormal CAAR compared to not mentioning these customer impacts ($p = .038$ and $.028$, respectively). This shows that professional investors agree with academics, recognizing the metaverse's profound impact on economic value creation through new opportunities in e-commerce and customers' social relationships around brand content (Hadi et al. 2023; Yoo et al. 2023). However, our analysis could not reveal a significant impact of *User Engagement* on the relationships between announcement and CAAR ($p = .135$). This can come as engagement in the metaverse is primarily achieved through immersive technologies, which we discuss followingly.

We hypothesized that referring to an immersive technology such as AR and VR can positively moderate the effect of firm announcements (H3a-b). Surprisingly, our analysis revealed a significant negative moderation effect ($p = .002$, each). While the metaverse can leverage immersive technologies to deliver value, professional investors seem to assess these to yet lack maturity and prefer business models that do not rely on their functionality. This comes as many challenges still obstruct augmented and virtual realities. With 18%, only a minority of the US population has access to a VR headset and, consequently, the offerings utilizing this technology (Shin 2022; Statista 2022). However, even if customers possess VR or AR goggles and use them to access unique metaverse experiences, health issues limit their usage time. For example, the UK government advises that VR headsets should only be used continuously for a maximum of 30 minutes (UK Government 2020). Conclusively, Schöbel and Tingelhoff (2023) summarize that these existing challenges still obstruct realizing the metaverse's potential, especially regarding longer user experiences (e.g., user engagement). Simultaneously, integrating VR and AR technology within a firm's metaverse offering can cause substantial investments and running costs, further limiting the offering's profitability. Accordingly, these can be reasons why metaverse offerings based on immersive technologies influence the effect of metaverse announcements on firm value negatively. Notably, if a company mentioned both, AR and VR, it was only punished once. Our analysis showed that there is a positive interaction effect between the two variables ($p = .007$) equally as high as each individual (estimates: $AR = -.076$, $VR = -.076$, $AR*VR = .073$). This indicates that investors did not differentiate whether a company mentioned AR, VR, or both.

Discussion and Conclusion

Our first hypothesis (H1) suggests that metaverse announcements by a firm positively affect firm value. We highlighted the importance of innovation and adaptation to new technologies in attracting investors (Kalaiganam et al. 2021) and the strategic interest in exploring novel ways to engage with customers (Di Gangi et al. 2010; Persaud and Azhar 2012). To test this hypothesis, we ran the commonly used FF3 return

model to calculate the abnormal return used as the dependent variable. The results support H1 and indicate that investors generally react positively to metaverse announcements, thus acknowledging the potential of metaverse technologies for customer channels.

Our second hypothesis (H2a-c) proposes that mentioning at least one of three specific metaverse customer impacts can enhance a company's value proposition, increasing overall firm value. The results of the study indicate that investors reward metaverse offerings that leverage the metaverse to foster *Economic Exchange* and *Complex Social Relationships*. This contradicts Bahmani et al. (2022), who examined the effect of voice assistant announcements on investor sentiment. According to their study, firms that emphasize such value creators are penalized by investors, as commerce and transactional services can introduce adverse effects that constrain or alienate users. However, investors may evaluate these metaverse offerings within the context as a complementary internet channel (Hadi et al. 2023) and, hence, as a strategic expansion of a firm's internet channels to complementing its core business activities. Specifically, the immersive nature of metaverses enables new forms of customer interactions (Dwivedi et al. 2022). For the first time, firms can make their offerings and brand values experiential, like Nike (2023), promoting its core values of sportiness and innovation through a metaverse sports competition. Metaverses can complement traditional channels to make offerings experiential for customers, which can be an attractive proposition for investors.

However, it is interesting and surprising to note that the benefits of the metaverse do not (yet) extend to *User Engagement*, despite the growing importance of cross-functional teams and knowledge sharing in today's dispersed work environments (Dwivedi et al. 2022). As *User Engagement* is often activated through creating immersive environments (Yoo et al. 2023), this can be linked to our third hypothesis. Here, we could show that, unexpectedly, investors penalize organizations if they referenced AR and VR technologies in their announcements. This could be mainly because organizations still struggle with adopting AR and VR headsets in their internal and external communication, as high costs and an unstable technological infrastructure impede its implementation into long-lasting business processes (Yoo et al. 2023). Moreover, governmental health agencies warn against the harmful effects of VR usage, such as addiction or nausea, and recommend limiting its continuous usage to 30 minutes (UK Government 2020), preventing effective use in enterprise collaboration settings. For many firms in the study, venturing into *User Engagement* in their business offerings is likely a highly explorative activity. Investors may not reward firms that venture too far from core activities as an excessive emphasis on exploration can lead to adverse performance and resource allocation problems (Rothaermel and Alexandre 2009). This re-emphasizes that, currently, the metaverse can be primarily understood as an additional customer channel (Hadi et al. 2023).

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