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Stock Markets' Reactions to the Announcement of the Hosts. An Event Study in the Analysis of Large Sporting Events in the Years 1976-2032

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Abstract

This study attempts to estimate the impact of the announcements of hosts of large sporting events on domestic stock markets. The research problem is to establish a connection between the uniqueness of a sporting event and investors' beliefs through stock price behavior. Using appropriate estimation windows, 13 different sporting events classified as large, including mega and major events, were tested. The obtained results show that, in principle, one day after the announcement of the host of a large sporting event, an average positive reaction of 0.22% is observed on national stock exchanges. The analyzed events were also classified as being neutral for capital markets or generating positive or negative reactions when the host country is announced to the public.

Keywords

Event study; Stock index; Sporting events; Olympic Games; Stock markets

Introduction

Stock markets are affected by a vast range of information provided both from domestic and foreign sources. Importance should also be attached to the news leading to possible government actions, which may have a substantial impact on the whole economy due to expected considerable amounts of money to be involved. Such "news", which are frequently related to announcements of different events, might be of various sources, including but not limited to economy and finance (Papasyriopoulos et al., 2007; Strauss & Smith, 2019; Law et al., 2020), politics (Quaye et al., 2016) and marketing (Becker-Olsen, 2003; Clark et al., 2009; Sorescu et al., 2017). In addition, recently in the literature, a number of studies can be found which refer to the sports area, including the examination of the impact of the announcements of various large sporting events on hosts' stock markets (Floros, 2010; Hood, 2012; Asteriou et al., 2013; Danylchuk et al. 2016; Refai & Eissa, 2017).

Basically, in the literature on the subject so far, there have been two trends in which the analysis of the impact of announcing the host of a large sporting event on stock markets is carried out. The former is of a purely economic nature, the basis of which is the prospect of supplying the economy with additional money intended primarily for the implementation of infrastructural plans: sports facilities, transport infrastructure, tourist infrastructure, etc. (Dick & Wang, 2010; Abuzayed, 2013; Ramdas et al., 2015; Refai & Eissa, 2017; Hayduk III, 2021). The latter is of a marketing nature and involves researching the impact of sports

sponsorship announcements on stock return (Floros, 2010; Hundt & Horsch, 2019; Eshghi, 2022; Eshghi, Shahriari & Ray, 2022).

Previous studies confirm that regardless of the adopted approach, be it economic or marketing, research results are inconclusive, ranging from positive (Abril, Sanchez & Recio, 2018; Hayduk III, 2021) through neutral (Fizel & McNeil, 2017), to negative ones (Martinez & Janney, 2015; Ramdas et al., 2015). This may indicate that although there are theoretical grounds for gaining benefits on financial markets due to the announcement of the results of selecting the host of a large sporting event, there are also some limitations resulting from the crowding-out effect (Liu & Wilson, 2014; Preuss, 2011) or the difficulty in convincing shareholders to reasonably large expenses incurred by sponsoring companies (Mazodier & Rezaee, 2013; Fizel & McNeil, 2017).

The research problem is to find out the connection between the uniqueness of a sporting event and investors' beliefs through stock price behavior. The implementation of this research problem should strengthen the existing theoretical framework by adopting, in addition to economic theories, also non-economic theories to explain the behavior of the capital market in the most comprehensive way possible as a result of announcing information about the organization of major sporting events. The results of the study may turn out to be valuable not only for stock exchange investors, but also for entities associated with the organization of events, such as sponsors, sporting event managers, and organizations of large sporting events. Although, in principle, this study is conducted on the basis of the economic trend with the use of event study methodology, the authors are aware of the imperfections of economic theories based mostly on the efficient-market hypothesis (Fama, 1970) and to a lesser extent on behavioral finance theory (Oprean & Tanasescu, 2014; Zawadzki, 2018). Therefore, in the section devoted to theories and theoretical models, an attempt was made to present other, non-economic theories adopted in different studies of sport management and sports economics (Eshghi, Shahriari & Ray, 2022; Filis & Spais, 2012). According to the authors, this is the first study to combine the economic and non-economic premises of price volatility in financial markets as a result of announcing the results of selecting the host of a large sporting event. This means that the study contributes to the development of the theory and makes it possible to gain a better understanding of the signals interpreted by stock market investors and originating from the disclosure of this type of information.

The event study generally assists in measuring changes in stock prices due to hosting sporting events (Samitas et al., 2008; Dick & Wang, 2010) and non-sporting events (Quaye et al., 2016; He et al., 2020). Although this study analyzes only sporting events, its scale is

unprecedented to the best of the authors' knowledge. The research covered 13 different sizes and referred to various sports disciplines, cyclical sporting events. The dates of the announcement of the host embraced nearly 50 years from 1974 to 2021. The main objective of the study is to analyze the reaction of the main national stock exchange indices to information on the organization of large sporting events by a given country. The indirect objective of this study is to distinguish and find the relationship between different sporting events considering the type (football/multidisciplinary), size (giga/mega/major), and time of the event (20th century/21st century).

In line with the discourse on the potential economic effects caused by the organization of large sporting events in recent years, the authors undertook the research to fill the gap in the scope of the potential impact of the organization of sporting events on the domestic financial market. It is important since the opinions on the broad economic effects of sporting events expressed so far differ and are ambiguous. While some experts point to positive opinions (Szymanski, 2002; Kasimati, 2003; Sterken, 2006; Li & McCabe, 2013), there are also dissenting voices. They emphasize the lack of overall effects or even their negative effects on the organizer's economy (Baade & Matheson, 2002; Dwyer et al., 2005; Zimbalist, 2015). Since sports federations (IOC, FIFA, UEFA, etc.) and policy makers (state and local governments) argue that organizing sporting events is supposed to provide benefits to the hosts' economy, the announcement of such events would also expected to positively affect local financial markets (Ashton et al., 2003). In other cases, none or negative effects would occur, which could undermine the sense of organizing a sporting event and spending money for this purpose.

The structure of the paper is as follows. The first section provides necessary information to identify and describe the history and nature of the impact that the announcement of hosts of large sporting events has on the stock market. The second section presents a theoretical framework and a research hypothesis. The third one deals with the concept and basic features of the concrete event study and statistical methodology employed in the paper, as well as the results of the empirical analysis. The next section is the discussion section. Finally, in the last section, the main conclusions are discussed.

Background study

A key research challenge in this study relates to the measurement of stock value's reaction to new information on hosting a mega sporting event. Without such new information,

it should be assumed that the market will follow no discernible pattern or trend, i.e., it will move according to the rules of the so-called random walk (Kwon & Cornwell, 2021). Whenever there is new information, the market reacts in the right way, which is reflected in stock prices. Information may contribute to both the growth and decline of the company's market valuation. Investors rate such news positively if it translates into generating future cash income by improving the company's image, brand awareness, increasing sales, etc. (Eshghi, Shahriari, & Ray, 2022). Information about the organization of a large sporting event evokes positive emotions related to development expectations of local companies as a result of their involvement in the broadly understood preparation process (Bruckner & Pappa, 2015; Langer et al., 2018). Nowadays, the requirements of sports federations regarding the appropriate preparation of sporting events are restrictive and are associated with the provision of not only sports facilities, but also transport, tourism, telecommunications and security infrastructure (Hayduk III, 2022). For this reason, companies representing selected sectors of the economy, such as the construction or tourism sector, can potentially benefit more from the organization of a sporting event than others, i.ee, those not participating in the race for large-scale infrastructure projects (Dollinger et al., 2010; Abuzayed, 2013; Hayduk III, 2022).

On the other hand, however, the enormous and constantly growing costs of sporting events provoke questions about the legitimacy of using financial resources, including, in particular, public funds (Zawadzki, 2017). The construction of a sports facility may exclude the implementation of tasks that are more important from the point of view of the local community's needs. In the context of sporting events, the concept of "white elephants" has often been used in recent years. These are structures that are oversized, unused, decaying and costly – not only in terms of construction but also maintenance (Davis, 2020; Zawadzki, 2022).

Therefore, if, in the opinion of investors, costs related to the organization of sporting events outweigh the benefits, this may be reflected in declines in the valuation of shares in financial markets (Martinez & Janney, 2015). The organization of an event may determine negative emotions on financial markets. Sources of such negative emotions do not necessarily have to be related to finance or sports themselves. An example in this regard is the boycott of the Tokyo 2020 Olympics as a result of the ill-treatment of animals or the 2008 Beijing Games associated with a polluted environment (Kwon & Cornwell, 2021).

Basically, in the literature to date, there are two trends in which the impact of announcing the results of selecting the host of a sporting event on stock markets is analyzed. The first one is economic, in which the impact of a sporting event on the economy is

analyzed, and the second one is marketing, in which sport sponsorship announcements are of paramount importance.

From the economic point of view, the fact that large sporting events impact stock markets results mainly from the organizer's economic funds (Baade & Matheson, 2004). Therefore, it is worth assuming that, if it were not for the organization of such events, there would be no financial flow coming from various sources: sponsors, organizers, tourists, media representatives, and, in particular, from public sources in the form of the state budget and self-government funds (Zawadzki, 2018). Matheson (2006) indicates two main reasons for supplying the host economy with additional money. The first stems from the implementation of wide-ranging infrastructural tasks. The second is associated with the influx of tourists and their expenses during their stay. This means that the organization of large events usually determines several impulses in final demand in the host's economy, affecting the increase in production, employment growth, etc. (Sterken, 2006; Feddersen & Maennig, 2009). At the same time, an appropriate promotion of and improvement to the image of the location where the event takes place may contribute to long-term positive economic effects – the so-called legacy (Preuss, 2007; Gratton & Preuss 2008; Cornelissen et al. 2011). Therefore, organizing a large event may impact stocks' prices in the short and long term.

The second approach involves sports sponsorship, which over the past two decades has gained a consistently increasing share of marketing budgets and has become an important component of the marketing communication mix and is now on par with traditional tools such as advertising, public relations, sales promotions, and personal selling (Reiser, Breuer & Wicker, 2012). The aim of the company's participation in sports sponsorship is to achieve favorable commercial advantages, including improved corporate image, brand awareness, and a boost in sales (Chen & Chen, 2012; Eshghi, 2022). The measurement of the effectiveness of sports sponsorship depends largely on the target audience, which includes consumers, general public or financial markets (Kwon & Cornwell, 2021). According to Cornwell & Kwon (2020), financial markets are one of the most frequently evaluated audiences. Sports sponsorship investments can be viewed as a credible sign of the financial well-being of companies (Eshghi, Shahriari, & Ray, 2022). Consequently, it contributes to a positive impact on the share market of a given company and shareholder value (Abril, Sanchez & Recio; 2018). However, such a positive relationship is not obvious. As sports sponsorship is associated with large expenses, market participants may sometimes consider these expenses as wasteful (Mazodier & Rezaee, 2013). They would decrease the value of the activity,

reflecting in the negative impact of such announcements on stock valuation (Martinez & Janney, 2015; Fizel & McNeil, 2017).

Depending on the adopted trend, it can be expected that the significance of the research problem tackled in this study for individual groups of recipients will be different. For the organizers of sporting events, the economic trend will be of particular importance. The public is widely informed about positive economic effects of organizing large-scale events. They are a derivative of large and constantly growing funds, which are supplied to the economy of the organizer, especially in the preparation phase. In this respect, particular importance should be attached to public funds, which are more frequently becoming the main source of financing for these events. For this reason, official reports and other studies prepared at the request of organizers lobby for the organization of sporting events by highlighting economic benefits to justify incurring high financial outlays from public sources (Kasimati, 2003, Zawadzki, 2017). In this sense, the positive impact of major sporting events on financial markets, the source of which is an increase in stock exchange indices, should be considered as expected and desired by organizers.

Sports sponsorships impact operate in different way. Eshghi, Shahriari & Ray (2022) pay attention to three groups of connections between potential stakeholders of undertaken marketing activities. First, spending on sports sponsorship is difficult to assess in the short term. Any possible returns such as a positive effect on image are frequently expected in the long run (Kim, Lee, Magnusen, & Kim, 2015). Therefore, the challenge for managers is to adequately explain to investors the legitimacy of incurring expenses in the short term after announcing the sponsorship. Otherwise, investors may decide to sell off the company's shares. Second, sports sponsorship announcements can serve as a general manager-shareholder informative role. Sports sponsorship announcements can indirectly convey the intentions and quality of the company's strategy, as well as the motivation for sustained competitive engagement, influencing the company's attractiveness to investors. Third, to attract investors' attention, announcing the intention to sponsor an event should not only be credible but also be easily observable. For example, sports sponsorship announcements are immediately visible in the media today. Investors may perceive them as a qualitative element, positively affecting shareholder value and manifested as an increase in the share price (Joshi & Hanssens, 2010).

The event study methodology is most frequently applied to investigate the impact of investors' reaction to the announcements of large sporting events (Eshghi, 2022; Hayduk III, 2022; Ramdas et al., 2015). Event studies emphasize the importance of new information related to a certain event, such as the announcement of a sporting event. When new

information hits the market, news spreads quickly and is reflected in stock prices. Beginning with the work of Farrell and Frame (1997) on announcing sponsorship of the 1996 Summer Olympics, event studies in the field of broadly understood sports have grown in popularity and reach, covering topics such as venue naming rights (Becker-Olsen, 2003; Leeds et al., 2007), scandals of athletes in private life (Hood, 2012), doping among athletes (Danylchuk, Stegink & Lebel, 2016; Drivdal et al., 2018) or corruption (e.g., Hundt and Horsch, 2019). The research contributed so far to the worldwide literature confirms the ambiguity of the impact of sporting events on the economy of the host. Nevertheless, the studies conducted thus far refer almost exclusively to mega events, including the Summer and Winter Olympic Games and the FIFA World Cup. In the context of sports sponsorship, the scope of the studies went beyond the largest sporting events and also concerned motor sports such as Indy 500 and NASCAR (Reiser, Breuer & Wicker, 2012) and major sporting leagues (Chen & Chen, 2012) or disciplines (Bouchet et al., 2017; Martinez & Janney, 2015).

Previous research results point to several regularities. Firstly, importance should be given to the category of a sporting event. For example, Mirman & Sharma (2008) analyzed the effects of announcing winners and losers for both Summer and Winter Olympic Games organized between 1996 and 2012. They found a small positive effect in the returns of hosts and runners-up of the Summer Games, but a strong negative reaction for the Winter Games. Ramdas et al. (2015) presented an even better confirmation that such studies yield different results and fail to indicate a direct relationship between the announcement of hosts of sporting events and stock market reactions. The analysis of five different FIFA World Cups in 1994–2010 showed a positive reaction (South Africa and Germany), as well as a negative one (France and South Korea), and a negligible one (Japan and USA) in host countries' stock markets. Simultaneously, the authors pointed to a number of recommendations for future research, including the proposal to compare older and more recent events of the same type, events organized in developing vs. developed countries, and, finally, paid attention to sector-specific analysis. Even though the largest events such as the Olympics and the FIFA World Cup are considered the most protected from a legal perspective (McKelvey and Longley, 2015), they are simultaneously the most aggressively ambushed by competitors, which may be reflected in the market's valuation and a stock price (Kwon & Cornwell, 2021). Moreover, according to Gopane & Mmotla (2019), losing bids to host the Olympics lead to considerable negative stock market reactions. This finding also appears to be justified given the expensive and resource-intensive nature of submitting a bid. Upon losing a bid to host the Olympic Games, market participants perceive a windfall in future economic activity and thus future

value that was nearly within reach, but ultimately had to be priced out of securities After losing a bid to host the Games, market participants see some limitations in future economic activity, that have to be valued out of stocks (Hayduk III, 2022).

The sectoral differentiation was noted by Verraros et al. (2004), who, in their study, showed an overall positive impact of the announcement of the Summer Olympic Games in 2004 on Athens Stock Exchange building and construction indices. Further, Floros (2010) confirmed the positive impact of the 2004 Olympic Games on national sponsors' stock prices. Hayduk III (2021) found that announcing PyeongChang as the 2018 Winter Olympic Games host had a beneficial effect on South Korea's Stock Exchange, with estimates suggesting a peak of +3.8% during the 15 trading days and translating into an increase in stock capitalization of USD 34.962 billion. According to the author, the degree to which companies benefited varied by industry and lifecycle stage. For example, larger abnormal returns were seen in case of older companies from both the financial and information technology sectors.

On the other hand, Dick & Wang (2010) analyzed 15 different Olympic Games organized in 1988–2014 and found that abnormal returns tend to be higher in small economies compared to large ones. In recent years, two independent studies examined the impact of the FIFA's official announcement of the host of the 2022 World Cup on the Doha Stock Exchange (DSE) (Abuzayed, 2013; Refai & Eissa, 2017). Qatar represents a small economy with a population of around 1.8 million and has a financial market that is classified as an emerging market. At the same time, selecting this country to host the 2022 World Cup requires huge expenditures due to infrastructure shortages. Nevertheless, the findings revealed by the authors of both papers confirmed that the DSE reacted significantly to the FIFA's announcement about the 2022 World Cup.

Theoretical framework, research hypotheses and literature support

News associated with hosting an event may trigger different stock price reactions based on positive or negative expectations of investors or no expectations at all (Abuzayed, 2013). Such investors' reactions stem from either the efficient-market hypothesis or behavioral finance theory. While the former assumes that the price of financial instruments is included in the information available at a given moment (Fama, 1970), the latter is focused on behavioral determinants: overconfidence, optimism, pessimism, herd instinct, and others that explain the occurrence of deviations of asset prices from their fundamental values (Akerlof & Shiller, 2009; Oprean & Tanasescu, 2014; Zawadzki, 2018).

The main assumption that provides the basis for the use of the event study method is that financial markets are efficient (McWilliams & Siegel, 1997). If market efficiency is true, then any new information revealed to investors will be instantaneously incorporated into stock prices. If the news is positive, the market reacts accordingly providing abnormal positive returns. By contrast, bad news may deliver abnormal negative returns (Kwon & Cornwell, 2021). A researcher is able to identify significant events by their impact on the stock prices of different companies. The event study method analyzes an event based on the interactions of many self-interested, objective and rational economic agents (Becker-Olsen, 2003). In this study, the announcement of large sporting events and its impact on stock prices is analyzed.

The use of the event study, although common, is associated with some problems. The first is the degree of predictability of the event and the point at which information actually reaches the market. Today, information is the fastest to reach others via the Internet; still, many investors use slower sources of obtaining information, such as television or printed newspapers. In addition, there is a risk of information leakage, which means that the flow of information is asymmetrical and the use of the event study is debatable (McWilliams & Siegel, 1997). In the context of this study, it is also necessary to assume that no other events disturb the results obtained by the information flowing from the publication of basic information. The so-called confounding effects (the declaration of dividends, announcement of a new product, change in a key executive) might have an impact on the price of shares, mainly in the case of long event windows. For this reason, it is important to eliminate the risks associated with the emergence of such disturbances by, for example, using appropriately short event windows.

Behavioral finance stands in opposition to the efficient-market hypothesis (Allen et al., 2015). Behavioral finance studies the investor's behavior and its effect on stock prices while investing in the stock market (Haritha & Uchil, 2016). Behavioral finance begins with the assumption that markets are not efficient much of the time, and this inefficiency can be explained by psychology and other social sciences (Quaye et al., 2016). According to some authors, human sentiments are better indicators of stock prices than any variable based on economic theory (Rehman, 2013). This is probably the reason why a number of studies have been conducted recently in which the impact of investors' behavior on asset prices was explored (Abuzayed, 2013; Zheng, 2015; Krishnan & Satish, 2016). However, Edmans et al. (2007) argued that three main factors should be considered before examining investors' behavior on the stock market. The first one is to drive investors' sentiments in a substantial and unambiguous way so that the effects of these sentiments are strong enough to be reflected

in share prices. The second one is to involve a large proportion of the population to affect the required number of investors. The last one is for the effect to concern the majority of individuals within a country.

Both the efficient-market hypothesis and behavioral finance illustrate that economic theories are not perfect, and their application requires a number of assumptions to be fulfilled. Moreover, both are based on a completely different approach. While the former expects rationality from investors, the latter is based on behavioral finance theory, which assumes that investors are irrational (Abuzayed, 2013). Therefore, price movements can be explained differently, especially when it comes to sports sponsorship.

The first approach is based on the resource-based view (RBV). Eshghi, Shagari & Ray (2022) refer to it as "marketing capability", which expresses a kind of efficiency in which a company turns its "marketing resources" into "desired performance objectives" that include sales or market share. If you take the fact that companies with a better "marketing capability" are able to benefit more from sports sponsorship as a real correlation, it may be reflected in the company's share price. Due to the fact that sports sponsorship announcements are immediately and transparently observable through media coverage, investors may be able to see these as indicators of good managerial activities that have a positive impact on shareholder value (Joshi & Hanssens, 2010). In principle, sports sponsorship involves significant expenses for the sponsor, which can be interpreted both positively and negatively by investors. Therefore, it is important to have a commitment between the sponsoring company and the sponsee that will cause an increase in ROI and will therefore be seen as a valuable sign of the financial well-being of the company (O'Reilly, 2019).

The spillover effect studied through the adaptation of the Image Transfer Model (ITM) in Event Sponsorships (Filis & Spais, 2012) further confirms that investors do not make investment decisions solely on the basis of financial fundamentals, but take into account non-economic factors, such as corporate and brand image when investing in the stock market. According to Frieder and Subrahmanyam (2005), investors may prefer companies with well-known corporate and brand names to companies with good financial fundamentals. The ITM is used to determine a specific relationship between sporting event image and sponsor or corporate image (Pracejus, 2004). In this concept, the uniqueness of a sporting event may affect investors' beliefs regarding the sponsor through stock price movement. The concept of spillover effects of a sporting event is of great value to company management as it deepens the understanding of the need to measure the uniqueness of every sporting event. This approach is very important because it can allow promotion managers to test different levels of

affecting public (e.g. investor's) opinions about the sponsor by monitoring audience behavior (e.g. through stock price dynamics) during a sporting event.

A variety of theories, sometimes contradictory, that explain price volatility on the stock market as a result of the organization of a sporting event may lead to different results during the implementation of a survey. In this study, only economic factors were used. They concerned entire economies (stock exchange indices) rather than selected sectors or companies (being, for example, sponsors of sporting events). Despite its weaknesses, the authors adopt the efficient-market hypothesis, which is expressed in the event study methodology. Nevertheless, the results of the studies conducted so far are inconclusive in this respect and indicate that different results should be expected. With this in mind, the following hypothesis is proposed:

Hypothesis 1: National stock exchange indices react ambiguously (both positively and negatively) to information on the organization of a large sporting event by a given country.

The importance of announcing the host of a sporting event to stock markets in the host country derives from expected significant funds to be added to the host economy on this occasion. Although the potential impact of large sporting event's organization refers to various areas, it considers economic ones (Preuss, 2004; Dwyer et al., 2005; Sterken, 2006; Zawadzki, 2013; Zimbalist, 2015). Correspondingly, large events are supposed to trigger economic effects divided into primary and secondary ones (Crompton, 1995; Kasimati, 2003). Primary effects are determined by the amount of autonomous expenditure incurred to organize the event (Baade, Matheson, 2004). Autonomous expenditure is primarily incurred in connection with non-sport infrastructural transformations (Ricquart, 1988; Millet, 1995; Chalkley & Essex, 1999; Essex, 2011), sport infrastructural transformations (Roaf et al. 1996; Searle, 2002; Barclay, 2009), and due to increased tourist flows (Weed & Jackson, 2009). Secondary effects are dependent on the size of the autonomous spending multiplier, which is explained, among others, by Keynesian theory (Despiney & Karpa, 2010). It means that although primary economic effects concern mainly selected sectors of the economy, such as construction or tourism, potential secondary effects involve the entire economy. In this regard, infrastructure investments reduce production and transaction costs, stimulate trade, create more favorable conditions for tourism development, improve inhabitants' quality of life, etc. Such a scenario may very likely become a factor driving the stock market boom.

However, the organization of large sporting events does not always contribute to positive economic effects, meaning that a positive impact on stock markets should not always be expected. The involvement of billions of funds, especially in the case of mega events,

requires the participation of the state and public funds, which, in turn, may determine the crowding-out effect (Liu & Wilson, 2014; Preuss, 2011). This effect consists in displacing investment projects not directly related to the event through its organization. In reality, it is the allocation of public funds to a different purpose (sports facilities, access roads to stadiums) compared with a scenario without the event (schools, hospitals). The involvement of public funds in preparation for such large projects as the Olympic Games or the largest football tournaments even provokes questions about the legitimacy of their use, especially in places where social needs for public goods are completely different. Another issue is that the increasing requirements of sports federations determine the construction of facilities that are too large and not adapted to the future needs of the local community, commonly referred to as "white elephants" (Alm et al., 2016; Davis, 2019). Indeed, in every country hosting mega events, one can find many examples of funds allocated to build stadiums, which could have found a better use elsewhere (Wasilczuk & Zawadzki, 2011). Furthermore, the crowding-out effect may involve the tourism sector (Baade & Matheson, 2004). According to the assumptions regarding this effect, some tourists who plan to visit a region hosting a mega sporting event may cancel their trip or choose another destination. Moreover, the inhabitants of the area leave the city or reduce their expenses for the duration of the event. The reasons for this are numerous. Most blame congested roads, traffic problems, and rising prices (Ahlert, Preuss, 2010). This means that many different tourist groups whose decisions will affect the host economy and, indirectly, financial markets can be identified.

Hypothesis 2a: The scale of the positive reaction of national stock exchanges to information about the organization of a sporting event depends on the size of the event.

Hypothesis 2b: The scale of the positive reaction of national stock exchanges to information about the organization of a sporting event depends on the number of the disciplines involved during the event.

Although the event study methodology is applied to broadly understood sports quite often (Becker-Olsen, 2003; Cornwell et al. 2005; Gannon et al., 2006; Spais & Filis, 2008; Scholtens & Peenstra, 2009; Tsiotsou, 2011; Danylchuk, Stegink, 2016), the number of studies concerning the impact that the announcement of hosts of sporting events has on stock markets is still relatively small. In particular, it applies to events not included in the largest sporting event group (Berman et al., 2000; Veraros et al., 2004; Floros, 2010; Mirman & Sharma, 2010; Refai & Eissa, 2017). It is not a new approach since notwithstanding the variety of contemporary events, the most critical criterion among researchers is event size (Roche, 1994; Roche, 2000; Rojek, 2014, Zawadzki, 2017). The interests of researchers

almost exclusively relate to larger ones referred to in the worldwide literature as major events (Abelson, 2011; Jakobsen et al., 2013) or the largest known as mega events (Preuss, 2007; Tien et al. 2011; Zawadzki, 2016). The reason for this is apparent. The scale of the event's potential impact increases with event size. There is no full compliance as to the attributes which should distinguish major and mega events from other types of smaller events. In consequence, there is variability in defining large events (Ritchie, 1984; Getz, 1991; Mules & Faulkner, 1996; Jago, 1997; Horne, 2007; Gold, Gold, 2011; Mills & Rosentraub, 2013; Müller, 2015; Zawadzki, 2017), though the most frequently cited attributes include:

- The frequency of the event.
- The uniqueness of the event.
- The number of observers.
- The recognition of the organizer.
- The size of expenditures.
- The participation of the state and public funds.
- Media attractiveness.
- The impact on the host.

In recent years, attention has been paid to the dynamic development of major and mega sporting events, which is reflected in the increase in the number of participants, competitions, or matches played. These events reach an ever-growing circle of recipients, and their organization leads to ever higher revenues (sale of tickets and TV rights) and constantly increasing costs. However, it is worth emphasizing that the scale of the impact of these events varies quite significantly depending on the analyzed category of events. For example, gigantism is primarily about the Summer Olympics – an event that in many respects (number of participants, sports, facilities, media and fan interest, costs) can hardly be compared to any other global event. As a result, there has been a recent proposal to introduce the term “giga event” in the worldwide literature to describe this largest of mega events (Mueller, 2015).

Major events are generally smaller and less expensive than their mega counterparts, yet they are still considered large (Gratton & Taylor, 2000). Mueller (2015) distinguishes between mega and major events based on four independent criteria: visitor attractiveness, media range, overall cost, and urban transformation. Based on these attributes, Mueller considers the Summer and Winter Olympic Games, largest football tournaments (FIFA, UEFA), and Asian Games as mega events. In addition, the Commonwealth Games, Universiade, and Pan American Games are considered major events. The same division was employed in this paper. Other large events but not meeting the above attributes for mega

sporting events (CONMEBOL Copa América, AFC AC, CAF ACN, Youth Olympic Games, Youth Winter Olympic Games) are major events. Although the number of the disciplines played as part of a given sporting event does not directly affect the classification of such an event into the major / mega / giga event group, multidisciplinary events are considered more complicated and require greater organizational commitment. Thus, they can affect more economic sectors and impact stock markets to a greater extent than events involving a single discipline.

Hypothesis 3: The scale of the positive reaction of national stock exchanges to information about the organization of a sporting event depends on whether the event was organized in the 20th century or in the 21st century.

This hypothesis is justified in two ways. Firstly, in recent years, a quantitative increase in large sporting events has been observed, resulting, among others, from the increasingly stringent requirements imposed on candidates for organizing sporting events by sports federations, or media development (Zawadzki, 2017). Secondly, it has lately become even more apparent that institutions responsible for choosing the host of large sporting events boldly focus on poorer countries or countries transforming their economies under the pretext of giving a stimulus to their development. For this reason, in the 21st century, the Olympics and the largest football tournaments (FIFA, UEFA) were organized, among others, in China, South Africa, Ukraine, Russia, Brazil, and Poland (Bohlmann & Heerden, 2008; Zawadzki 2016; Lepschy, Woll, and Wäsche; 2021). In both cases, it can be assumed that this will affect the valuation observed in stock markets.

Methodology

The main research objective in this paper is to analyze the reaction of the main national stock exchange indices when the information about the host country to organize a large sporting event is given. In addition, the following events were classified as large sporting events (the abbreviated names of the studied events, used later on in the study, are given in parentheses):

- Asian Football Confederation Asian Cup (AFC AC),
- Asian Games (AG),
- Commonwealth Games (CG),
- Confederation of African Football African Cup of Nations (CAF ACN),
- FIFA World Cup (WC),
- Pan American Games (PAG),
- South American Football Confederation Copa América (CONMEBOL CA),

- Summer Olympic Games (SOG),
- UEFA European Football Championship (EURO),
- Universiade (UNIV),
- Winter Olympic Games (WOG),
- Youth Summer Olympic Games (YSOG),
- Youth Winter Olympic Games (YWOG).

This analysis considers all events planned for the years 1976–2032. Notably, among them, the authors analyzed those events whose host country announcement date was from January 1, 1972 to July 31, 2021. The starting date was limited by a benchmark used for all calculations, which was published daily from that date. The authors used the MSCI World Index as a benchmark, which captures large and mid-cap representation across 23 Developed Markets countries. With 1,601 constituents, the index covers approximately 85% of each country's free float-adjusted market capitalization (MSCI, 2020)[1].

The number of all sporting events initially qualified for the research sample was 205. For 65 events (mainly the 20th-century events such as AFC AC, CAF ACN, CONMEBOL CA, and UNIV), it was impossible to determine the exact date on which the host was announced. Therefore, these events were excluded from the analysis. Also, the research sample was reduced if there was no stock exchange in the host country when the event host was announced. Due to the lack of a functioning stock exchange in a given country, further 40 studies were omitted. This omission also covered three events for which the host was announced before January 1, 1972. What is more, due to the announcement of the 1976 Winter Olympic Games on May 12, 1970, which were initially to be organized by the United States of America, these Olympic Games were also omitted[2]. The UEFA EC 2020 was omitted as well due to the event taking place in 12 European countries/cities. As a result, 98 events were selected and formed the basis of the study. The characteristics of the selected events are presented in Table 1.

Of these 98 events, four were hosted by two countries (FIFA WC 2002; UEFA EC 2000, 2008, 2012), and one event will be organized by three countries (FIFA WC 2026). These events are given in italics in Table 1. Ultimately, 104 events were used for the analysis because events having more than one organizer were treated as separate events for each

[1] The MSCI data contained herein is the property of MSCI Inc. (MSCI). MSCI, its affiliates, and its information providers make no warranties with respect to any such data. The MSCI data contained herein are used under license and may not be further used, distributed, or disseminated without the express written consent of MSCI.
[2] The United States of America withdrew from the organization of the event on November 7, 1972, and Austria was selected the new host.

hosting country. It is worth noting here that when events having more than one host were excluded from the research sample the results are still firm in the context of statistical significance. We prepared such second calculations without co-host events to verify the resistance of the obtained results.

The study was performed in the following six sections (specifications):

- for all events,
- broken down into purely football events (football group) and multidisciplinary events (multidisciplinary group),
- broken down by event size,
    - broken down into mega (SOG) and major groups,
    - also broken down into giga (only SOG), mega (without SOG), and major events,
- broken down into 13 analyzed groups of events,
- broken down into events announced in the 20th century and those announced in the 21st century.

The event study analysis described, among others, by Gurgul (2019) and Sorescu et al. (2017) was used as a research tool. The calculations were performed in the R program, using the "EventStudy" package developed by Schimmer et al. (2015). The calculations were based on the quotations of the main domestic stock exchange indices and their values at the end of the day. The names of the indices are also listed in Table 1. We calculated log returns to perform the event study analysis based on these values. The authors made similar calculations for the index that served as the basis for comparisons. The market model was used to estimate the following equation for each national stock index in which logarithmic MSCI returns were the explanatory variable:

$$R_{i,t} = \alpha_i + \beta_i * R_{m,t} + \varepsilon_{i,t}$$

where:

$R_{i,t}$ – the rate of return for domestic stock index "i" on day "t",

$R_{m,t}$ – the rate of return for the MSCI World Index on day "t",

$\varepsilon_{i,t}$ – the random component,

α_i, β_i – the estimated market-based model parameters.

The authors of this study used the market model according to Sharpe (1963) and Corrado (2011). The application of the market model was also enhanced by Castro-Iragorri (2019). In that paper, the author concludes that the use of a more sophisticated method than

the market model to estimate the rate of returns does not improve the results to be obtained. The models were estimated using one hundred observations, the last of which was taken for estimation until seven days before the event, i.e., the moment when the choice of the host of a given event was made public. In the next step, the estimated models were used to determine abnormal return (AR) rates using the equation:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i * R_{m,t})$$

Apart from the AR rate, the study also uses AAR, CAR, and CAAR rates. The tested rates were established according to the formulas included in Schimmer et al. (2015):

$$AAR = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}$$

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

$$CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR(t_1, t_2)$$

Where:

AAR – the average abnormal return,

N – the number of analyzed events in each group,

CAR – the cumulative abnormal return,

t_1 – the beginning of the research window (in this study – always one day before the event),

t_2 – the end of the research window (in this study – always three days after the event),

CAAR – the cumulative average abnormal return.

It is worth noting that the authors examined the average effect in the studied groups in detail, which means that the values of the test statistics were calculated for the AAR and CAAR. The authors used the AAR for testing if the analyzed hosts announcements have an immediate effect on the national stock exchange of the host country (AAR(0)) or to check if that effect is achieved on certain day in the research window (AAR's from (-1) to (3), without AAR(0)). The CAAR is used to check if the announcement has sustained a positive, negative or neutral short-term effect.

The window that was analyzed in detail ranges from the day before the event to three days after the host selection results were announced (-1, 3). With such a defined event window, it is possible to identify possible abnormal return rates that could appear the day

before the event, which could be associated with unofficial information about the selection of the host of a given event. On the other hand, if it can be assumed that some investors' reactions to the analyzed event are reflected in capital markets, it should appear immediately; hence three days after the event also seem to be a sufficiently long time. This means that designating a longer event window would pose a risk of distorting the results due to disruptive events. The analysis is presented graphically in Figure 1.

Further, it was assumed that if the date of the host announcement of the analyzed sporting events fell on the weekend, the first working day on which stock exchange quotes were available was assumed as the event day.

To evaluate the statistical significance of the obtained results for the AAR and CAAR rates, the authors used the parametric Patell test (Patell Z) and its modified version from 2010 (Adj. Patell Z), which are resistant to cross-sectional correlation. The methodology described in Patell (1976) and Kolari and Pynnönen (2010) was applied to perform both tests.

Results

As mentioned in the previous section, this study aims to assess the mean impact of each defined group of events on the national stock exchange. Assessing the impact of a single event can be interesting but does not provide general conclusions that are available when the group of events is analyzed. But to be accurate and to give a better insight into the results obtained in this study, the authors first present basic descriptive statistics for each AR and CAR in Table 2. These statistics are calculated based on all 104 analyzed events.

The data presented in Table 2 reveal that on the event date, there is an average positive value equal to 0.127% above the normal return. That positive abnormal rate of return is observed on the next day and two days after the event as well. Two days after the event, the value of the abnormal rate is similar to that on event day and is equal to 0.123%, whereas one day after the event, the abnormal rate is the biggest with a value of 0.221% on average. When the abnormal rates are added through the entire event window, the value of that sum is equal to 0.365%, which gives the value of the cumulative abnormal return. Based on these values, it can be said that a positive effect is observed for all analyzed events, and the announcement of the host of the analyzed events has, on average, a positive effect on the national stock exchange.

However, the reaction of each national exchange is more complicated because the number of positive and negative values of abnormal returns is almost equal in all presented cross-sections. The greatest differentiation between those two measures is observed on the

event day, with sixty positive values being recorded. Surprisingly, one day after the event, when the highest positive abnormal rate of return was observed, the number of rates bigger than zero was smaller than those which were negative. This points to a high differentiation in a national stock exchange reaction to the analyzed event. This is the main reason why the authors tested all events in so many cross-sections. The remaining descriptive statistics (Min, Max, Std. Dev.) presented in Table 2 also show that it is impossible to draw general conclusions by analyzing the AR and CAR for single events.

Table 3 shows the values of the AAR in the investigated event window, along with the values of the test statistics for both tests. Statistically significant values were also exposed.

Based on the data in Table 3, one can see that the first method of examining all events together (specification 1) is the basis for the conclusion that the day after the announcement of the host on the stock exchanges of these countries, one observes abnormal, positive rates of returns. Thus, the average determined rate of return for all analyzed events is 0.22% on the day after the event. However, the results show the lowest level of statistical significance.

After the study sample was divided into purely football and multidisciplinary events (specification 2), the results obtained confirm only abnormal return rates for the latter group of events. No abnormal and statistically significant return rates were recorded for football events on any of the analyzed days. In the case of the group of multidisciplinary events, both calculated test statistics point to abnormal and positive rates the day after the announcement of the host of such an event. Compared to specification 1, the authors observed an increase in statistical significance to $\alpha = 0.05$. The tested rate of return also increased to 0.35%.

The authors divided the analyzed events into mega and major events in specification 3. At the same time, the event related to the organization of the Summer Olympic Games was classified as a mega event. For this division, it turned out that none of the examined days within the event window generated abnormal return rates that would be statistically significant in the major event group. However, the case is different for mega events. For these events, as in the case of multidisciplinary events, there is an abnormal, positive and statistically significant ($\alpha = 0.05$) rate of return the day after the event.

In specification 4, the organization of the Summer Olympic Games was distinguished from the mega events group . This time, the Summer Olympic Games were included in the group of giga events. This in no way changed the results for the major event group. They were identical to the specification 3 of the study so they are not included in Table 3. However, the separation of the Summer Olympic Games from the group brings about a significant change in the results obtained. The events that remained in the mega event group are no longer

possible to generate statistically significant abnormal return rates on any analyzed days. The situation here is the same as with major events. On the other hand, on the exchanges located in countries that were awarded the organization of the Summer Olympic Games, abnormal and positive and statistically significant rates were again recorded one day after the event. Importantly, also on the day of the event, there was a positive and abnormal rate, but its significance level is $\alpha = 0.1$. Nevertheless, the cumulative abnormal rate of return on these two days is close to 1%.

Specification 5 of this study led to a significant reduction in the size of individual groups, as at this stage, each sporting event was examined only in the same event group. Table 3 presents only the results for events whose number was greater than six because the authors wanted to avoid giving results based on a smaller sample. The results for the Summer Olympic Games were not repeated, as these results were identical to specification 4 involving the giga event group. The first conclusion from specification 5 is that the announcement of the organizer of the Winter Olympics causes abnormal and statistically significant drops in the national stock exchange of the organizer. This rate is -0.68%.Such a result is not surprising and confirms the results of research obtained, among others, by Mirman & Sharma (2008).Moreover, it turned out that the right to host the FIFA WC and the organization of the Summer Olympic Games generated abnormal positive rates on the host country stock exchange. The abnormal rates came for the FIFA WC on the event day and the day after it. In both cases, their value was above 0.4%, but on the day of the event, the statistical significance of the result was $\alpha = 0.1$, and on the following day, it was $\alpha = 0.05$. In the previous study specifications, no positive effect of the organization of football events was noted, which can be linked to another conclusion found for the organization of the ACN CAF. For this event, on the host country announcement date, the host country's stock exchange recorded an abnormal, positive rate of 0.46% at $\alpha = 0.1$. On the other hand, the day after the announcement, the stock exchange recorded an abnormal and statistically significant ($\alpha = 0.05$) but negative rate of return -0.6%. This means that the CAF ACN organization has a positive effect on the day of the event, but on the next day, there is a significant sell-off on the organizer's stock exchange. This phenomenon should be studied further. It can be attributed to the influx of speculative capital to African countries on the event and the fast profit-taking the next day. Moreover, with the CAF ACN organization, turbulence is often associated with selecting the host country. In 2013, 2015, and 2017, it was the case when there were resignations and selections of the organizing countries.

It is worth adding that after excluding the events organized by more than one country from the research sample, the organization of the UEFA EC event also generates statistically significant and abnormal return rates. In this case, on the day of the event, the AAR rate is 0.49% at $\alpha = 0.05$. This finding proves that the organization of this event by a single host has a greater effect on the country's stock exchange than organizing it by more than one country, which is a rational conclusion.

The last group of events showing abnormal and statistically significant rates of return was the Commonwealth Games. Even though only six situations in which the host country was announced were examined, all of them were characterized by an abnormal and statistically significant positive rate one day after the event day. The average analyzed rate was 1.55%, and the statistical significance of the result was the highest of the considered ones, i.e., $\alpha = 0.01$. In the case of other sporting events, no statistically significant results were found.

In specification 6, the authors divided the sample into event organizers announced in the 20th century and the 21st century. Based on these results, it seems that markets react to an event on the day the event for events announced in the 21st century. For the second study group, it was the day after the event day. This can be associated with the strong digital transformation of exchanges in the 21st century and automated trading systems. As a result, abnormal rates of return were determined, and their statistical significance turned out to be higher for the events announced in the 20th century. However, it should be noted that the events in the 21st-century group were twice as many, and, as demonstrated in the conclusions from the previous specifications, the events that did not have a statistically significant impact on the obtained results were also analyzed here.

In the next step, the CAAR rate was calculated for all studied specifications together with the test statistics. The results are shown in Table 4.

The table shows all the results obtained for the CAAR rate but only the statistically significant ones are bolded. In specification 3, the mega events had the lowest statistical significance ($\alpha = 0.1$). However, these results are influenced by the fact that in specification 4, the events classified as giga events, i.e., the Summer Olympic Games, turned out to be statistically significant, and the other mega events are no longer statistically significant for the CAAR rate. Moreover, only the organization of the FIFA WC in the analyzed event window (-1, 3) showed the statistical significance of the results for the CAAR rate. For this event, the cumulative abnormal rate is 0.95%. However, the results are not in favor of recommending

the buy-and-hold investment strategy because statistical significance is the lowest of the statistical significance values adopted in this paper.

Discussion

In general, on the basis of obtained results, we confirm that one day after the announcement of the host of a large sporting event, an average positive reaction of 0.22% is observed on national stock exchanges. Investors and money managers may employ this information by investing money in a host nation's index to obtain an abnormal return on the next day equal to 0.22%. This will be valid when those interest groups accurately predict the host.

In more detail, the results prove that national stock exchange indices react ambiguously (positively, negatively or neutral) to information on the organization of a large sporting event by a given country. The positive reaction is found when the host of the CG, SOG or WC is given to the public, which was also confirmed by (Abril, Sanchez & Recio, 2018; Hayduk III, 2021). The negative reaction is recorded in the case of the WOG, which is in line with (Martinez & Janney, 2015; Ramdas et al., 2015). For the rest of the analyzed events, the abnormal return was not statistically significant. This leads to the conclusion that announcing the host of the AG, CAF ACN, EURO, PAG, and UNIV is neutral for capital markets. The same conclusion is formulated in (Fizel & McNeil, 2017). These findings are true for the analysis of every single day within the event window and there is no reason to reject Hypothesis 1 based on the results.

This difference in investors' behavior towards new information cannot confirm the efficient-market hypothesis in simple terms. For the CG, SOG, WC and WOG, new information about the host country generates strong enough reactions, and statistically significant abnormal rates of return are obtained. This is an argument to confirm the efficient-market hypothesis. But the same conclusion cannot be drawn from the other analyzed groups of sporting events because for them, the generated abnormal returns are not statistically significant.

The above findings have serious consequences for investors, policy makers and sponsors. Investors should be aware that only when the host of the CG, SOG and WC is chosen, the announcement constitutes strong enough positive information to affect the market. Announcing the host of these three events can be a source for investors to gain an abnormal return and beat the market. The key actions that investors should take are connected with buying stocks or national indexes of the announced host country on the day of the event and

selling them the fastest on the second day after the event occurs. In the case of announcing the host of the WOG, the short selling strategy in a short period is optimal.

For policy makers, the authors of this study present the following finding: Positive capital market reactions can be observed for the CG, SOG or WC so only these three sporting events are worth organizing from a financial point of view. This is another argument that can be used to persuade all stakeholders interested in organizing large sporting events. The organization of the WOG does not give positive results for the capital market shortly after announcing the host. The decision about the organization of that event should consider the fact that the announcement of the WOG generates short-term loss in capital markets.

The following rule is formulated based on the results concerning the AAR: the organization of the AG, CAF ACN, EURO, PAG, UNIV is neutral for capital markets, the organization of the CG, SOG or WC is positive for them and the organization of the WOG is negative for the capital market. That rule can be helpful for potential host countries in selecting an event to be the host of.

In the case of the WOG, the negative impact on financial markets may have several reasons. Firstly, this category of events was mostly hosted during the research period by countries included in the G7 group. In the case of these economies, it is difficult to consider the organization of the WOG as a stimulus to their development. Secondly, infrastructure demand in these countries can be considered negligible – most of the event takes place in the existing or possibly slightly modernized facilities. Thirdly, whether or not the Winter Games are successful depends on weather conditions, which is not the case for other events. Admittedly, modern technological development makes it possible to make, transport and store snow, but this involves a large amount of money, which increases the costs of the event and is difficult to predict. Therefore, events in this category may be more expensive than other sporting events, as exemplified by the Olympic Winter Games in Sochi 2014, which consumed at least USD 50 billion (Zawadzki, 2017). In addition, these events are not as popular as the Summer Olympics or the FIFA WC, which translates into a lower flow of tourists.

The durability of the positive reaction is also confirmed by the CAAR tests in the case of the SOG and WC, but the negative reaction in the case of the WOG is not confirmed by the CAAR tests. It can be concluded that the negative reaction for the WOG is temporary and occurs only on the day of the event.

Taken together, these findings lead the authors to conclude that without taking into account the WOG, the scale of the positive reaction of national stock exchanges to

information about the organization of a sporting event depends on the size of the event. However, the authors did not find any evidence to confirm that the scale of the positive reaction of national stock exchanges to information about the organization of a sporting event depends on the number of the disciplines involved during the event.

Regarding the last hypothesis that the scale of positive reaction of national stock exchanges to information about the organization of a sporting event depends on whether the event was organized in the 20th century or in the 21st century, the authors found an interesting deviation of they we expected to get. The results are based on the conclusion that the reaction to announcing the host country of large sporting events is, in the 21st century, weaker and faster than in the 20th century. This conclusion is true for both AAR and CAAR analysis. This stems from the digitalization of financial markets (Marszk & Lechman, 2021) and the ability of investors to react faster to new information.

To assure the methodological rigor in this study in terms of credibility, dependability, and transferability, it should be noted that this quantitative analysis covers all the selected sporting events from 1974 to 2021. The group of events is closed. To perform a wider study, two approaches can be adopted: extending the time period of the study or considering a greater number of large but still smaller events (World Championship in Handball). The results remain robust if the authors exclude the events organized by more than one host country. The detailed information about input settings for event study analysis, which was provided in the methodological section, should be used for new research cases. In future research using the research sample covered in this paper, it can be tested if using more sophisticated methods for model market returns as described by (Castro-Iragorri 2019) will affect the findings demonstrated in this paper. Importantly, the results for the AAR are not sensitive to the analyzed event. However, this is not confirmed for the CAAR. Still, long-term investment strategies can be formulated when other, longer event windows are adopted. The results presented in this paper should also be verified with different statistical tests to confirm their repeatability. In the future, it is also worth checking if similar effects can be generalized for different well-known non-sporting events, e.g., announcing the EXPO host.

Conclusions

This study demonstrated that the organization of the Summer Olympic Games and FIFA WC triggers statistically significant abnormal and positive return rates both on the day of the event (statistical significance $\alpha = 0.1$) and the day after the event (statistical

significance $\alpha = 0.05$). This effect is even stronger on stock exchanges in their host countries. Therefore, it can be concluded that these two events are the basis for generating abnormal profits to investors in the short term, i.e., on the day of the event and the day after the event. However, the cumulative abnormal positive return was at the lowest tested statistical significance level for the entire examined event window. This means that the organization of the Summer Olympic Games and the FIFA WC cannot be used to apply the buy-and-hold strategy in the analyzed window (-1, 3) but should allow the investor to obtain above-average positive interest rates in the window (0, 1).

Such results, especially in the case of the Summer Olympics, have their theoretical justification. Events of this rank should be classified as the largest and most demanding, also in terms of infrastructure tasks, which generate greater capital needs than other categories of events, especially in the preparation phase. Apart from primary effects, the involvement of multibillion-dollar funds causes induced effects due to the possibility of reusing the "new" money. If the employed financial resources do not generate adverse effects (e.g., excessive indebtedness) or support projects contributing to such effects (e.g., the crowding-out effect), there will be room for the emergence of positive economic impact. It will be reflected in a positive stimulus to financial markets. However, it should be stressed that this stimulus is short-lived and does not allow the observed changes in the valuation of shares to be considered the event's legacy, i.e., favorable long-term effects. This is due to the adopted research concept and the event window applied in this paper.

The findings concerning the organization of the Winter Olympics and the ACN CAF are surprising and demand further analysis. In the case of the former, abnormal negative rates were recorded on organizers' stock exchanges on the day of the event. The authors of this study associate this phenomenon with investors' concerns about additional threats to the organization of this category of events (unpredictable costs, weather uncertainty) and with smaller benefits (less interest in this category of events by tourists). As for the CAF ACN, negative abnormal interest rates were observed the day after the event, which should be associated with the confusion about the announcement of the event host, which is often the case, and the outflow of speculative capital from Africa. The results concerning the organization of the Commonwealth Games are also interesting and require further research. For this event, in all six analyzed cases, there was an abnormal and positive rate of return greater than zero the day after the event. This means that this event had the highest statistical significance in this study. The study also found that the events organized in the 21st century

had a faster impact on the tested rates, i.e., already on the event day, compared to those hosted in the 20th century. For the latter, the effect was visible the day after the event.

From the methodological point of view, it is also interesting that the results for the Summer Olympic Games were statistically significant, and the "strength" of this event translates into statistically significant results also in larger research groups (e.g., for mega or multidisciplinary events). On the other hand, the case is different for the FIFA WC. This event does not lead to statistically significant results for the football group; however, the authors of this study found statistically significant results after dividing football events into more detailed subgroups.

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Table 1. Characteristics of the analyzed sporting events

No.	Name of the event	Years the sporting event took place or is planned to be held. In parentheses, the country and name of the analyzed stock index are given, respectively.	Host country announcement date	Event category – research section two	Event category – research section three
1	AFC AC	2011 (Qatar, QE General – QSI), 2015 (Australia, All Ordinaries Index), 2019 (United Arab Emirates, ADX General – ADI), 2023 (China, Shanghai Composite Index)	July 29, 2007 January 5, 2011 March 9, 2015 June 4, 2019	Football event	Major event
2	AG	1986 (South Korea, KOSPI), 1998 (Thailand, SET Index), 2002 (South Korea, KOSPI), 2010 (China, Shanghai Composite Index), 2014 (South Korea, KOSPI), 2018 (Indonesia, Jakarta Composite Index), 2019 (Vietnam, VN), 2022 (China, Shanghai Composite Index), 2026 (Japan, NIKKEI 225), 2030 (Qatar, QE General – QSI), 2034 (South Arabia, Tadawul All Share)	November 26, 1981 September 27, 1990 May 23, 1995 July 1, 2001 April 17, 2007 September 19, 2014 November 8, 2012 September 16, 2015 September 25, 2016 December 16, 2020 December 16, 2020	Multidisciplinary event	Mega event
3	CAF ACN	2004 (Tunisia, Tunindex), 2006 (Egypt, EGX 30), 2013 (South Africa, South Africa Top 40 – JTOPI), 2015 (Marocco, Moroccan All Shares – MASI), 2017 (South Africa, South Africa Top 40 - JTOPI), 2019 (Egypt, EGX 30), 2021[a] (Ivory Coast, BRVM 10), 2023 (Ivory Coast, BRVM 10)	September 4, 2000 October 24, 2002 September 28, 2011 January 29, 2011 January 29, 2011 January 8, 2019 September 20, 2014 January 30, 2019	Football event	Major event
4	CG	1994 (Canada, S&P/TSX Composite Index), 2010 (India, SENSEX 30 Index), 2014 (Scotland, FTSE 250), 2018 (Australia, All Ordinaries Index), 2022[b] (South Africa, South Africa Top 40 – JTOPI), 2022 (England, FTSE 250)	September 15, 1988 November 14, 2003 November 9, 2007 November 11, 2011 September 2, 2015 December 21, 2017	Multidisciplinary event	Major event
5	CONMEBOL CA	2011 (Argentina, Merval Index), 2015 (Chile, IPSA Index), 2016 (United States of America, Dow Jones Industrial), 2019 (Brazil, Bovespa Index)	November 25, 2008 May 13, 2012 May 1, 2014 May 13, 2012	Football event	Major event
6	EURO	1984 (France, CAC40),	December 10, 1981	Football event	Mega event

		1988 (West Germany, DAX), 1992 (Sweden, OMX Stockholm 30 Index), 1996 (England, FTSE 250), *2000 (Belgium/Netherlands, BEL 20/AEX Index),* 2004 (Portugal, PSI 20 Index), *2008 (Austria/Switzerland, ATX/Swiss Market Index),* *2012 (Poland/Ukraine, WIG/UX Index),* 2016 (France, CAC40), 2024 (Germany, DAX)	March 15, 1985 December 16, 1988 May 5, 1992 July 14, 1995 October 12, 1999 December 12, 2002 April 18, 2007 May 28, 2010 September 27, 2018		
7	PAG	1987 (United States of America, Dow Jones Industrial), 1999 (Canada, S&P/TSX Composite Index), 2007 (Brazil, Bovespa Index), 2011 (Mexico, Mexican Bolsa Index), 2015 (Canada, S&P/TSX Composite Index), 2019 (Peru, S&P Lima General), 2023 (Chile, IPSA Index)	December 18, 1984 July 31, 1994 August 24, 2002 June 2, 2006 November 6, 2009 October 11, 2013 November 4, 2017	Multidisciplinary event	Major event
8	SOG	1984 (United States of America, Dow Jones Industrial), 1988 (South Korea, KOSPI), 1996 (United States of America, Dow Jones Industrial), 2000 (Australia, All Ordinaries Index), 2004 (Greece, ATHEX Composite Index) 2008 (China, Shanghai Composite Index), 2012 (Great Britain, FTSE 250), 2016 (Brazil, Bovespa Index), 2020 (Japan, NIKKEI 225), 2021 (Japan, NIKKEI 225)[c], 2024 (France, CAC40), 2028 (United States of America, Dow Jones Industrial), 2032 (Australia, All Ordinaries Index)	May 18, 1978 September 30, 1981 September 18, 1990 September 24, 1993 September 5, 1997 July 13, 2001 July 6, 2005 October 2, 2009 September 7, 2013 March 30, 2020 September 13, 2017 September 13, 2017 July 21, 2021	Multidisciplinary event	Giga event/Mega event
9	UNIV	2011 (Chiny, Shanghai Composite Index), 2015 (South Korea, KOSPI), 2017 (Taipei, TAIEX Index), 2019[d] (Brazil, Bovespa Index), 2019 (Italy, FTSE MIB Index), 2021 (China, Shanghai Composite Index), 2023 (Russia, RTS Index USD)	January 16, 2007 May 23, 2009 November 29, 2011 November 9, 2013 March 5, 2016 December 13, 2018 July 2, 2019	Multidisciplinary event	Major event
10	WC	1994 (United States of America, Dow Jones Industrial), 1998 (France, CAC40), *2002 (Japan/South Korea, NIKKEI 225/KOSPI),*	July 4, 1988 July 2, 1992 May 31, 1996	Football event	Mega event

		2006 (Germany, DAX), 2010 (South Africa, South Africa Top 40 – JTOPI), 2014 (Brazil, Bovespa Index), 2018 (Russia, RTS Index USD), 2022 (Qatar, QE General – QSI) *2026 (Canada/Mexico/United States of America, Dow Jones Industrial/Mexican Bolsa Index/S&P/TSX Composite Index)*	July 7, 2000 May 15, 2004 November 30, 2007 December 2, 2010 December 2, 2010 June 13, 2018		
11	WOG	1980 (United States of America, Dow Jones Industrial), 1988 (Canada, S&P/TSX Composite Index), 1992 (France, CAC40), 1994 (Norway, OSE All Share Index), 1998 (Japan, NIKKEI 225), 2002 (United States of America, Dow Jones Industrial), 2006 (Italy, FTSE MIB Index), 2010 (Canada, S&P/TSX Composite Index), 2014 (Russian Federation, RTS Index USD), 2018 (South Korea, KOSPI), 2022 (China, Shanghai Composite Index), 2026 (Italy, FTSE MIB Index)	October 23, 1974 September 30, 1981 October 17, 1986 September 15, 1988 June 15, 1991 June 16, 1995 June 19, 1999 July 2, 2003 July 4, 2007 July 6, 2011 July 31, 2015 June 24, 2019	Multidisciplinary event	Mega event
12	YSOG	2010 (Singapore, Straits Times Index), 2014 (China, Shanghai Composite Index), 2018 (Argentina, Merval Index)	February 21, 2008 February 10, 2010 July 4, 2013	Multidisciplinary event	Major event
13	YWOG	2012 (Austria, ATX), 2016 (Norway, OSE All Share Index), 2020 (Switzerland, Swiss Market Index), 2024 (South Korea, KOSPI)	December 12, 2008 December 7, 2011 July 31, 2015 January 10, 2020	Multidisciplinary event	Major event

[a] Ivory Coast resigned after being chosen

[b] South Africa resigned after being chosen

[c] Due to the pandemic, it was announced that the SOG be postponed and moved to 2021

[d] Brazil resigned after being chosen

Table 2. Descriptive statistics for ARs and CAR

Descriptive statistics	AR(-1)	AR(0)	AR(1)	AR(2)	AR(3)	CAR
Mean	-0.025%	0.127%	0.221%	0.123%	-0.081%	0.365%
Median	-0.015%	0.190%	-0.080%	0.090%	-0.115%	0.230%
Min	-4.530%	-2.460%	-2.970%	-3.190%	-2.060%	-6.000%
Max	4.820%	3.360%	7.550%	4.030%	2.850%	11.330%
Std. dev	0.013	0.011	0.013	0.011	0.010	0.025
Kurtosis	4.064	0.921	8.677	1.752	0.567	3.044
Skewness	0.660	0.266	1.887	0.344	0.451	0.847
Number of positive values	51.000	60.000	50.000	56.000	45.000	55.000
Number of negative values	53.000	44.000	54.000	48.000	59.000	49.000

Table 3. The results of the research carried out in the AAR context

Number of specification	Grouping variable/N	Characteristic	AAR(-1)	AAR(0)	AAR(1)	AAR(2)	AAR(3)
1	ALL (N=104)	AAR value	-0.03%	0.13%	0.22%	0.12%	-0.08%
		Patell Z	-0.179	1.365	1.908 (*)	0.812	-0.71
		Adjusted Patell Z	-0.179	1.367	1.911 (*)	0.814	-0.711
2	FOOTBALL (N=41)	AAR value	-0.08%	0.15%	0.03%	0.07%	0.09%
		Patell Z	-0.859	1.246	-0.136	0.625	0.617
		Adjusted Patell Z	-0.856	1.241	-0.136	0.623	0.615
	MULTIDISCIPLINARY (N=63)	AAR value	0.01%	0.11%	0.35%	0.16%	-0.20%
		Patell Z	0.464	0.748	2.561 (**)	0.539	-1.41
		Adjusted Patell Z	0.465	0.751	2.568 (**)	0.541	-1.414
3	MAJOR (N=43)	AAR value	-0.01%	0.10%	0.17%	0.08%	-0.21%
		Patell Z	-0.312	0.595	0.459	0.364	-1.11
		Adjusted Patell Z	-0.312	0.595	0.459	0.364	-1.111
	MEGA (N=61)	AAR value	-0.04%	0.14%	0.26%	0.15%	0.01%
		Patell Z	0.028	1.282	2.106 (**)	0.755	0.005
		Adjusted Patell Z	0.029	1.286	2.112 (**)	0.757	0.005
4	GIGA (N=13)	AAR value	0.39%	0.25%	0.68%	-0.18%	-0.32%
		Patell Z	1.331	1.753 (*)	2.115 (**)	-0.085	-0.776
		Adjusted Patell Z	1.33	1.75 (*)	2.111 (**)	-0.084	-0.775
	MEGA (N=48)	AAR value	-0.16%	0.11%	0.14%	0.24%	0.10%
		Patell Z	-0.661	0.534	1.274	0.895	0.41
		Adjusted Patell Z	-0.656	0.53	1.265	0.889	0.407
5[a]	AG (N=11)	AAR value	-0.19%	0.56%	-0.08%	0.17%	0.31%
		Patell Z	-0.542	0.775	-0.269	-0.522	0.449
		Adjusted Patell Z	-0.526	0.753	-0.261	-0.507	0.436
	CAF ACN (N=8)	AAR value	0.24%	0.46%	-0.60%	0.33%	0.34%
		Patell Z	-0.526	-0.526	-0.526	-0.526	-0.526
		Adjusted Patell Z	-0.526	-0.526	-0.526	-0.526	-0.526
	CG (N=6)	AAR value	-0.66%	-0.11%	1.55%	-0.60%	-0.40%
		Patell Z	-1.158	0.103	4.059 (***)	-0.98	-0.816

		Adjusted Patell Z	-1.131	0.1	3.964 (***)	-0.957	-0.797
	EURO (N=13)	AAR value	0.07%	0.16%	-0.11%	0.05%	-0.06%
		Patell Z	0.233	0.952	-0.561	0.297	-0.663
		Adjusted Patell Z	0.231	0.945	-0.557	0.295	-0.658
	PAG (N=7)	AAR value	0.26%	0.28%	0.01%	0.09%	-0.38%
		Patell Z	-0.109	0.586	-0.479	-0.048	-1.668 (*)
		Adjusted Patell Z	-0.111	0.598	-0.489	-0.049	-1.702 (*)
	UNIV (N=7)	AAR value	0.27%	0.48%	-0.27%	1.04%	-0.25%
		Patell Z	0.87	0.817	-0.629	1.887 (*)	-0.494
		Adjusted Patell Z	0.864	0.812	-0.626	1.876 (*)	-0.491
	WC (N=12)	AAR value	-0.24%	0.44%	0.42%	0.26%	0.07%
		Patell Z	-0.819	1.699 (*)	2.144 (**)	1.246	0.656
		Adjusted Patell Z	-0.826	1.714 (*)	2.163 (**)	1.257	0.662
	WOG (N=12)	AAR value	-0.28%	-0.68%	0.35%	0.49%	0.09%
		Patell Z	-0.226	-2.366 (**)	1.244	0.735	0.423
		Adjusted Patell Z	-0.225	-2.348 (**)	1.235	0.73	0.42
6	XX (N=31)	AAR value	-0.06%	-0.06%	0.51%	0.14%	0.06%
		Patell Z	-0.375	-0.227	2.173 (**)	0.52	-0.312
		Adjusted Patell Z	-0.373	-0.226	2.165 (**)	0.518	-0.311
	XXI (N=73)	AAR value	-0.01%	0.21%	0.10%	0.12%	-0.14%
		Patell Z	0.031	1.777 (*)	0.861	0.631	-0.644
		Adjusted Patell Z	0.031	1.781 (*)	0.863	0.632	-0.646

[a] To avoid drawing general conclusions based on the events group for which the number of events was smaller than six, we excluded such groups from our analysis and did not present their results in this section.

In order to highlight statistically significant results additionally marked "***" for $\alpha = 0.01$, "**" for $\alpha = 0.05$ and "*" for $\alpha = 0.1$.

Table 4. The research results in the CAAR context

Number of specification	Grouping variable	CAAR value	pos:neg CAR	Patell Z	Adjusted Patell Z
1	ALL (N=104)	0.36%	55:49	1.429	1.384
2	FOOTBALL (N=41)	0.26%	22:19	0.667	0.609
	MULTIDISCIPLINARY (N=63)	0.44%	33:30	1.298	1.334
3	MAJOR (N=43)	0.15%	22:21	-0.002	-0.002
	MEGA (N=61)	**0.52%**	**33:28**	**1.868 (*)**	**1.93 (*)**
4	**GIGA (N=13)**	**0.82%**	**10:3**	**1.94 (*)**	**1.894 (*)**
	MAJOR (N=43)	0.15%	22:21	-0.002	-0.002
	MEGA (N=48)	0.44%	23:25	1.096	1.105
5	AFC AC (N=4)	-1.88%	0:4	-1.231	-1.221
	AG (N=11)	0.76%	4:7	-0.048	-0.043
	CAF ACN (N=8)	0.77%	6:2	1.299	1.255
	CG (N=6)	-0.22%	4:2	0.54	0.567
	CONMEBOL CA (N=4)	**-0.27%**	**1:3**	**-2.494 (**)**	**-2.355 (**)**
	EURO (N=13)	0.11%	7:6	0.115	0.107
	PAG (N=7)	0.26%	3:4	-0.768	-0.818
	SOG (N=13)	**0.82%**	**10:3**	**1.94 (*)**	**1.894 (*)**
	UNIV (N=7)	1.27%	4:3	1.096	1.057
	WC (N=12)	**0.95%**	**8:4**	**2.203 (**)**	**1.905 (*)**
	WOG (N=12)	-0.03%	4:8	-0.085	-0.089
	YSOG (N=3)	0.65%	2:1	0.276	0.272
	YWOG (N=4)	-0.64%	2:2	0.547	0.586
6	XX (N=31)	0.59%	17:14	0.796	0.76
	XXI (N=73)	0.27%	38:35	1.187	1.125

Figure 1. Graphic representation of the conducted study windows