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Virus (COVID-19) Epidemic and Sports Performance: Evidence from Asian Professional Football Clubs

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Epidemia COVID-19 a osiągnięcia sportowe zawodowych klubów piłkarskich z Azji

Streszczenie

Kiedy wirus COVID-19 rozlał się po świecie, naukowcy wykonali wiele badań skoncentrowanych na sporcie i COVID-19, ale brakowało w nich metod ilościowych. Dlatego też celem niniejszych badań było ukazanie wpływu epidemii COVID-19 na osiągnięcia sportowe azjatyckich klubów piłkarskich za pomocą regresji kwantylowej. Badanie wykonano z użyciem danych panelowych piętnastu azjatyckich klubów piłkarskich w celu określenia ich osiągnięć sportowych. Co więcej, w badaniu zgromadzono przypadki zachorowań i zgonów spowodowanych wirusem COVID-19, służące jako dwie inne zmienne. Wyniki pokazują, że z uwagi na fakt iż szacunki współczynnika (stopień zależności) dla każdego kwantyla są równe (zarówno dla wpływu przypadków zachorowań – CA na osiągnięcia sportowe – SP jak i wpływu przypadków zgonów – DE na SP), struktura zależności

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jest określana jako stała. Dlatego też pozytywny szacunek i jego odpowiednik we wszystkich kwantylach dla wpływu zachorowań na wirusa COVID-19 (CA) na osiągnięcia sportowe (SP) pokazują, że przypadki zachorowań COVID-19 (CA) mają stały pozytywny wpływ na osiągnięcia sportowe (SP). Negatywny szacunek i jego odpowiednik we wszystkich kwantylach dla wpływu zgonów spowodowanych wirusem COVID-19 (DE) na osiągnięcia sportowe (SP) pokazują, że przypadki zgonów spowodowanych wirusem COVID-19 (DE) mają stały negatywny wpływ na osiągnięcia sportowe (SP).

Słowa kluczowe: osiągnięcia sportowe, piłka nożna, Azja, zawodowy klub, epidemia COVID-19.

Abstract

When the COVID-19 epidemic spread around the world, researchers did many studies about sports and COVID-19, but there was not much quantitative research. Therefore the purpose of this study was the effect of the COVID-19 epidemic on the sports performance of Asian football clubs with quintile regression. This study used panel data for fifteen Asian football clubs from April to December 2020. The research used the points of Asia football clubs to estimate their sports performance. Also, this study collected cases and deaths caused by the COVID-19 epidemic as the other two variables. According to the results, because coefficient estimates (degree of dependence) for each quantile are equal (for both effects CA on SP and effect DE on SP), the dependence structure is said to be constant. Therefore, a positive estimate and equivalent in all quantile for the impact of cases of COVID-19 virus (CA) on Sports Performance (SP) show that cases of COVID-19 virus (CA) have a constant positive effect on sports performance (SP). A negative estimate and equivalent in all quantile for the impact of death of COVID-19 virus (DE) on Sports Performance (SP) show that death of COVID-19 virus (DE) has a constant negative effect on Sports Performance (SP).

Keywords: Sports Performance, Football, Asia, Professional Club, the COVID-19 epidemic.

Introduction

On March 11, 2020, the World Health Organization announced that COVID-19 had become a global epidemic. More than five months later (August 28, 2020), health systems in many countries were still affected by the disease, and more than 880,000 people died from the virus. Many countries have experienced economic problems due to measures taken to suppress or reduce the epidemic [31]. Governments faced the virus and its problems, so they took steps to reduce the spread of the virus. Most governments used social distancing to keep person-person distance to limit the spread of the virus [34]. In this regard, all kinds of organizations suffered from the COVID-19 epidemic; professional sports such as football also faced problems during the COVID-19 epidemic. Currently, football is a sport with the most participation, influence, and income in the world, which affects not only sports but also social, economic, and even cultural sectors [15]. At the beginning of 2020 (January to March), the world, including the world of sport, faced a state of uncertainty in which practice became hard, and all sports competitions were postponed. The health of the athletes, coaches, and spectators became a priority, and the most important competitions, such as the Euro-

pean Football Championship and the Olympic Games in Tokyo, were postponed. The COVID-19 epidemic has caused financial and social problems to athletes, coaches, clubs, and sports federations. All teams sent their athletes home. Athletes could not follow their regular training and competition schedule at home. Regardless of its duration, staying at home (quarantine) could have a significant effect on the physical and mental state of athletes [22]. Moreover, quarantine can have a massive effect on the sports performance of football players. The COVID-19 pandemic forced professional football leagues worldwide into extended breaks, followed by a prompt resumption of competition. A study of the Bundesliga German football league proves that potentially inadequate periods of football-specific training may increase injury incidence in the first three games following the restart compared to pre-lockdown [10]. Also, Dönmez et al. show a significant positive correlation between Epidemiologic Studies Depression score and self-quarantine days in the players from 36 professional football teams ($n = 977$) in the Turkish Super League [13]. In addition, the effects of COVID-19 have led to a decrease in revenues, and professional football clubs are still trying to contain the economic effect of the COVID-19 pandemic [17].

Therefore, the COVID-19 pandemic has had destructive effects on the football industry, including its financial and social problems, quarantine, athlete injuries, and mental and psychological issues. These problems can decrease the sports performance of professional football clubs. Some studies examined the effect of the COVID-19 pandemic on athletes' performance in qualitative, descriptive, and quantitative (questionnaires) methods. The econometric studies in the field (COVID-19 and sports) are scarce. Therefore, this study investigates the effect of the COVID-19 pandemic on sports performance by the econometric method. For this purpose, this study used panel data for fifteen Asian professional football clubs from April to December 2020. Research collected the points of Asian football clubs to estimate sports performance. Also, this study collected two variables of cases and deaths of the COVID-19 epidemic. Finally, this study used the econometric method of quintile regression for data analysis.

Theoretical Background and Relevant Literature

COVID-19 epidemic in Asia

COVID-19 is a new type of coronavirus identified in China. Now its cases have been recognized in all countries in Asia, Australia, Europe, and North America [36]. The COVID-19 epidemic threatens humanity due to its continuous spread. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) originated in wild animals [35]. This disease (COVID-19) has symptoms such as fever, dry

cough, shortness of breath, and fatigue. COVID-19 has now spread over 206 countries or territories of the world. At the beginning of the COVID-19 epidemic, due to the unavailability of pharmaceutical means, different countries applied various policies to limit this epidemic. The most common was quarantine [28]. Then they started making vaccines. The vaccine reached people late, and the countries faced many problems. The COVID-19 epidemic began in Asia. Asian countries took different approaches to predict and handle this issue. The numbers of cases and deaths of the COVID-19 epidemic are very different in Asian countries. As other countries around the world confront their COVID-19 challenge, there may be much to learn from the experiences of various Asian countries (particularly China, South Korea, and Iran) [39]. The COVID-19 epidemic has had a significant effect on global economies. Market and economics have been affected, and Asian countries have been affected more negatively than other countries [16]. The economic impact of the outbreak of COVID-19 has had disastrous effects on the well-being of families and communities of Asia. For example, for low-income families, lost income due to the outbreak of COVID-19 would increase poverty, lead to famine, and reduce access to healthcare facilities. This phenomenon has been noticed in South Asia [21]. Many studies emphasized the effect of the COVID-19 epidemic on Asian countries. Islam et al. show that the outbreak of COVID-19 decreased the gross domestic product (GDP), having a detrimental effect on significant economic sectors and indicators in the South Asian economies [21]. Also, Abiad, Arao, and Dagli show that the range of scenarios explored due to COVID-19 in developing Asian economies, in brief, suggests a global impact of \$77 billion to \$347 billion or 0.1% to 0.4% of global GDP, with an average case estimate of \$156 billion or 0.2% of global GDP. Two-thirds of the impact falls on the PRC, where the outbreak was concentrated [2].

COVID-19 and its impact on sport

The COVID-19 pandemic greatly impacted various parts of society, including economic, social, cultural, and sports areas in Asia. This disease put many countries in a state of quarantine. Also, sporting events (including the 2020 Olympics) were affected by COVID-19. Participation in sports was limited too. The local professional football leagues ultimately postponed all matches after much deliberation on the risk of lost transmission for TV spectators and on-field players [43]. Ratten [30] states that the COVID-19 crisis has significantly influenced the sports sector in a way that has never been seen before. Without a doubt, COVID-19 is the main word that defines the socio-cultural and economic situation of 2020. Also, in Asia, COVID-19 influenced sport. This epidemic first influenced East Asia, before the WHO declared it a global pandemic. The professional baseball and football leagues in this region delayed their opening matches until the virus was

under control. Additionally, the 2020 Tokyo Olympic Games were postponed until July 2021. After having interrupted the sporting schedule in East Asia in the first quarter of 2020, COVID-19 invaded West Asia [38].

COVID-19 and its impact on Asian Champions League 2020

Football is the most important sport in the world. Football has engendered excitement among people throughout Asian regions since its introduction on that continent. Numerous Asians enjoy football as practitioners, audiences, and fans; hence the Asian markets for broadcasting football events and football-related goods have recently expanded. In addition, some regional football leagues, such as the Asian Cup and Asian Champions League, have also been created and evolved. Within the past couple of decades, several club leagues in Asian countries have received great investments, and they are emerging in global competitions by recruiting international football players and coaches [9]. Before the FIFA World Cup 2002 in Korea and Japan, there was a belief that Asian football teams could not achieve success, and Asian footballers and teams were criticized for lacking quality at an international level. On the other hand, the situation was different in women's football, and China had an outstandingly successful international team during its 'golden age' from 1986 until 1999 [40]. After choosing Korea and Japan as hosts for the World Cup, FIFA and the Asian Football Confederation (AFC) improved the situation of Asian football and its member associations so that they could operate on a much broader scale than hitherto [24]. By its slogan 'The Future is Asia', the AFC initiated the Vision Asia football development program in 2003. It aimed at increasing the standards of Asian football at all levels, including the field of play, administration, or sports science [19]. In 2018-2019, Asia was on the verge of significant improvements in football according to its planning. Suddenly, it faced the global virus, COVID-19. At the time, football competitions without fans with artificial crowd noise were the only live sport in the world [38]. Accordingly, the COVID-19 pandemic stopped the majority of sporting events. Some of these events were conducted without spectators. For example, the Tokyo Summer Olympics and Paralympics 2020 were rescheduled for July 2021, and the Union of European Football Associations (UEFA) postponed its 2020 Champions League matches as a preventive measure to avoid the spread of the virus [12]. Also, the outbreak of COVID-19 in Asian countries made the Asian Football Confederation (AFC) postpone the AFC Champions League. Finally, the Asian Football Confederation (AFC) decided to hold a sporting event in Qatar. The tournament resumed from 14 September to 3 October in four stadiums across Qatar, three of which are FIFA World Cup 2022 stadiums. Along with Jassim bin Hamad Stadium, home of local QSL side Al Sadd SC, Qatar 2022 venues Khalifa International Stadium, Al Janoub Stadium, and

Education City Stadium hosted matches in the group stage until the semi-final. The Qatar Football Association (QFA), the Supreme Committee for Delivery & Legacy (SC), and the Qatar Stars League (QSL) have worked with the Asian Football Confederation (AFC) to implement measures and protocols to ensure the safety of players and tournament officials. These included mandatory COVID-19 testing, safe transportation methods, regular disinfection of all tournament venues, including training and media facilities, as well as the provision of medical staff in stadiums throughout the competition. Hosting the AFC Champions League marks a significant milestone in the return of football at a continental level following the unprecedented disruption of the few months. To ensure the safe and gradual return of Asian football, and in line with the State of Qatar's commitment to limit the spread of COVID-19, no fans were permitted into stadiums during the tournament. As per the regulations stipulated by the Ministry of Public Health (MoPH), all players and tournament officials tested for COVID-19 upon their arrival in Qatar at Hamad International Airport (HIA). In order to take part in the event, participants were quarantined until their test results were negative. As soon as they arrived in their designated accommodation, players and tournament officials were placed in a medical bubble that limited their movement only to their designated accommodation, stadiums, and training sites. Individuals in the same medical bubble were not permitted to make contact with anyone outside their bubble to prevent the spread of COVID-19. Players and tournament officials always wore masks when the tournament activities kicked off. Also, they maintained the social distance between individuals with a 1.5-meter space per Qatar's health protocols. Moreover, food and beverages were not allowed inside the stadium. One protocol mandates that the teams were only transported in small groups of a maximum 50 percent capacity using alternate seats and maintaining the 1.5-meter distance. Other preventive measures show that the tournament venues' capacity was strictly monitored and disinfected regularly. All stadiums were equipped with medical clinics fitted with a team of medical staff. The stadiums also had dedicated isolation rooms to hold any individual exhibiting symptoms of COVID-19 or requiring any medical assistance [1].

COVID-19 and its impact on Asia Football Clubs Performance

The COVID-19 epidemic has had different effects on the sports performance of football clubs and their athletes. These essential effects include financial problems, mental and psychological issues, and injuries to athletes. Bond et al. show that holding competitions without spectators and fans has created many financial problems and issues for football clubs [7]. COVID-19 has caused a shock in society and the world of sport. Therefore, sports and football competitions

without spectators and fans comprised many financial issues that threatened the sustainability and future of many football clubs [7]. Wilson, Plumley, Mondal, and Parnell provided an analysis of the impact of COVID-19 on English football's finances that indicate that the financial consequences of COVID-19 are severe for football's financial area [41]. Three important sources of clubs' revenue are match day, commercials and broadcasting, and ticket sales [29]. Indeed, Football clubs are more dependent on match-day revenue than other revenue [42]. According to the COVID-19 pandemic rules, competitions had to be run without spectators, and many clubs suffered a financial burden through revenue losses [12]. Football clubs are dependent on their fans and spectators. They need to sell tickets and commercials on match days to earn revenue. Football competitions during COVID-19 were played without spectators in many Asian football leagues, including Iran and Saudi Arabia. Even the Asian Champions League was held without spectators in many matches. Because of such a situation, many Asian football clubs were deprived of earning revenue on match day. These circumstances affected the sports performance of Asian football clubs.

During COVID- 19, many athletes were quarantined because their COVID-19 tests were positive. Therefore, athletes were likely to be exposed to some level of detraining as a consequence of inappropriate training stimuli, which may result in impaired performance and increased injury risk [12]. Dergaa et al. offered solutions for organizing football matches with spectators during the COVID-19 pandemic in the Amir Cup Football Final of Qatar 2020 [12]. As, Yousfi, Bragazzi, Briki, Zmijewski, and Chamari state, it is so important to pay attention to issues such as nutrition, fasting and calorie restriction, immune system, vitamin D, adequate sleep, physical exercise, and psychodynamic management during the COVID-19 period, especially for quarantined athletes [44]. Further on, they offer some recommendations for improving athletes. The quarantine during the COVID-19 pandemic manifested significant physiological changes in elite football players. Although it will differ from country to country, the return to sport for professional football players will follow a forced quarantine never experienced and longer than the regular annual season break. Moreover, in addition to a noticeable decrease in performance, the quarantine will possibly increase the injury risk [6]. Asian Champions League and inner leagues have rules for the quarantine of club football players. Many players of Asian football clubs could not accompany their clubs due to quarantine, and even when they returned to competitions after quarantine, they could not have a good performance. Also, there was a quarantine of sports teams in the Asian Champions League 2020, in Qatar, and this issue affected the athletes' sports performance.

The pandemic of COVID-19 continues. The fear of sickness or losing one's life because of contamination, helplessness, and loneliness due to isolation is known, in many individuals, to lead to a spread of public mental health and psy-

chological crises concerning anxiety, stress, or depression [14]. These effects can be observed in football players such as Mehrosafar, Moghadam Zadeh, Jaenes Sánchez, and Gazerani. They provide the first preliminary evidence that COVID-19 anxiety and competitive anxiety might have a negative impact on the athletic performance of professional football players during COVID-19 pandemic competitions [26]. Professional athletes are under competitive stress; however, they are also affected by the physical and mental consequences of the COVID-19 pandemic [25]. The impact of the pandemic on professional athletes' mental health originated from the cancellation or postponement of matches, violation of training, and frequent removal and placement of quarantine, generating uncertainty for their athletic careers [11]. Based on the opinion of Reardon et al. elite athletes have receive special care regarding their mental health during the pandemic [32].

Method

Data and Analysis

This paper used panel data to analyze data. The panel data within this study is a combination of time-series and cross-sectional dimensions, thus eliminating many of the disadvantages of cross-sectional or time-series data. The panel data captures more social and economic information, has control over potential heteroskedasticity, and significantly avoids biased estimates caused by ignoring variables. Also, the panel data increases the explanatory power of the samples and increases the reliability of the results [18]. Therefore, this paper uses monthly data (April to December of 2020) of Asian football clubs points for 15 clubs to estimate the Sport performance variable. These clubs have the highest point score among Asian football clubs according to FIFA Ranking. They include Persepolis and Esteghlal of Iran, Al Nassr and Al Hilal of Saudi Arabia, Jeonbuk FC and Ulsan Hyundai of South Korea, Kawasaki Frontale and Kashima Antlers of Japan, Al Duhail SC and Al-Sadd of Qatar, Guangzhou F.C, Beijing Guoan and Shanghai Port F.C of China, Pakhtakor Tashkent of Uzbekistan and Buriram United of Thailand. This paper also uses monthly data (April to December of 2020) of Cases and Deaths from the COVID-19 virus in countries including Iran, Saudi Arabia, South Korea, Japan, Qatar, China, Uzbekistan, and Thailand. In this study, SP is a symbol for the variable of Sports Performance, which was collected from the website (www.footballdatabase.com). Also, CA and DE are symbols for variables of cases and deaths from the COVID-19 virus. This Research collected CA and DE from the World Health Organization (WHO) (<https://covid19.who.int/table>). The table offers the summary statistics for the aforementioned variables.

Table 1. Summary statistics for the variables

Variables	Sym- bol	Mean	Median	SD	Min	Max	JB	Prob.
Sports Performance	SP	1573/94	1570	45/67	1497	1686	8/16	0/01
Cases	CA	145870/4	87680	205409/1	1887	1206373	1009/26	0/0000
Deaths	DE	5028/53	1264	10012/20	8	10012/20	1113/09	0/0000

Source: own research.

According to Table 1, the mean sports performance of Asian Football Clubs in the period of nine months from April to December of 2020 is 1573/94, and this value fluctuates between 1497-1686 points. Also, the mean of cases of COVID-19 for the countries from April to December of 2020 is 145870/4 cases. These numbers fluctuate between 1887 – 1206373 cases in Asian countries. Finally, the mean of death from COVID-19 in the period of nine months from April to December of 2020 is 5028/53 deaths, and these numbers fluctuate between 8 – 10012/20 cases in Asian countries.

Figure 1 shows the status of the cases-cumulative total of the COVID-19 virus for the countries from April to December of 2020 (1-9). The trend of the COVID-19 virus is increasing in all the countries from April to December of 2020. However, Iran and Saudi Arabia had the highest cases-cumulative total of the COVID-19 virus in this period.

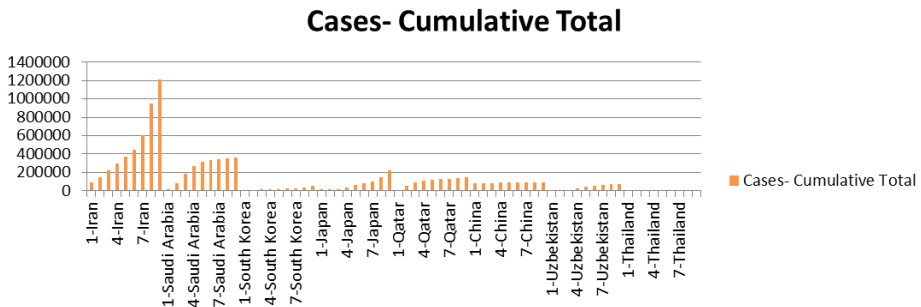


Figure 1. Trend for cases-cumulative total of the COVID-19 virus for the Asian countries

Source: own research.

Figure 2 shows the status of the deaths-cumulative total of the COVID-19 virus for the countries from April to December of 2020 (1-9). The trend deaths-cumulative total of the COVID-19 virus is increasing in all the countries from April to December of 2020, but Iran and Saudi Arabia, respectively, had the highest deaths-cumulative total of the COVID-19 virus in this period.

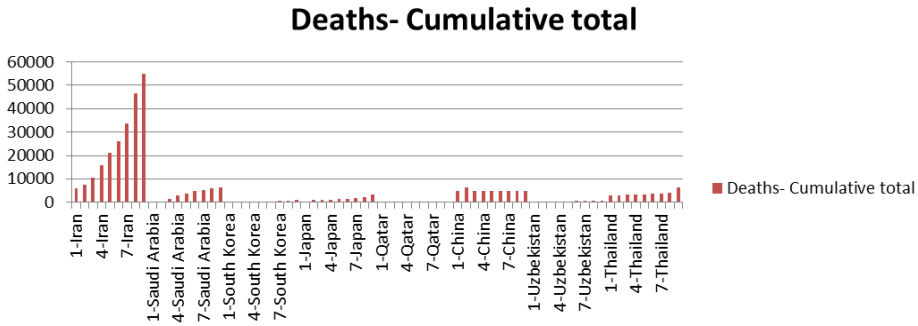


Figure 2. Trend for deaths-cumulative total of the COVID-19 virus for the Asian countries

Source: own research.

Figure 3 shows the status of point score of Asian football clubs according to the FIFA ranking for football clubs from April to December of 2020 (1-9). Some clubs' points were increasing, although some clubs' points were declining. Also, the trends of some clubs were fluctuating.

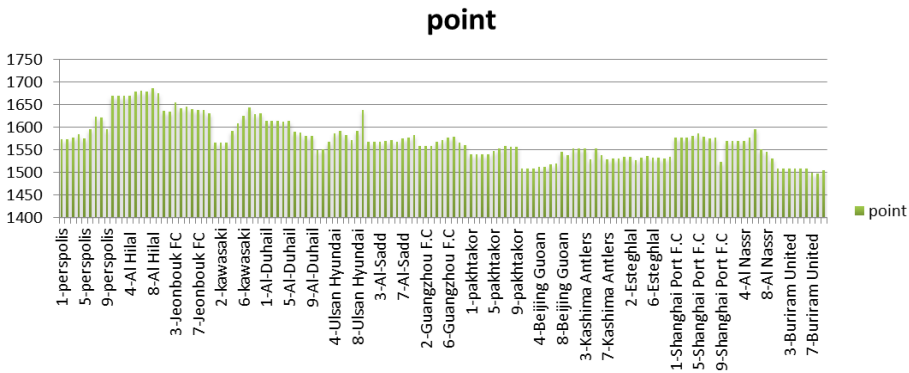


Figure 3. Trends for Sports Performance (Points) of Asian Football Clubs

Source: own research.

Analysis and Equations (Quantile Regression Approach)

This paper employs the panelized QR (Quantile Regression) of Koenker and Bassett [23] to study the effect of the cases and death of the COVID-19 epidemic on the sports performance of Asian football clubs. In experimental studies, researchers are interested in analyzing the behaviors of dependent variables to obtain information contained in a set of regressors (explanatory variables). In order to estimate the linear regression model and its unknown parameters, studies usually use the standard methods of Ordinary Least Squares (OLS) or the Least Absolute Deviations. The OLS method calculates the parameter estimation

by minimizing the sum of squares of error and leads to an approximation of the conditional mean function of the dependent variables. The LAD method minimizes the sum of absolute errors and results in an approximation of the conditional median function. As long as the complete conditional distribution is considered, describing only the conditional median or mean is not very satisfactory. Therefore, a suitable method in regression analysis is the Quantile Regression method of Koenker and Bassett. The QR method of Koenker and Bassett provides the estimates of the degree of dependence conditional on each quantile [4]. It can reveal any structure of dependence, such as symmetric (e.g., a u-shaped structure or an inverted u-shaped structure) and asymmetric with a left-tail or a right-tail structure of dependence. For example, if the coefficient estimates (i.e., degree of dependence) for each quantile are equal, the dependence structure is said to be constant. If the estimates are equally high in the tails with lower values in the intermediate quantiles, there is a symmetric u-shaped dependence. If the coefficient estimates monotonically increase from the lower quantiles to the upper quantiles, there is an asymmetric dependence structure with right-tail dependence. If the coefficient estimates monotonically decrease from the lower quantiles to the upper quantiles, there is an asymmetric dependence structure with left-tail dependence [3]. According to Baur, there is no need to determine an ad hoc structure for QR since the type of structure is an outcome of the piecewise estimation process of dependence across all quantiles. Therefore, QR offers a more comprehensive picture of any structure while accounting for non-linearities and asymmetries [4]. Therefore, this study considers an equation (Eq1) according to the QR method of Koenker and Bassett:

$$\text{Eq1: } SP_{it} = \beta_0 + \beta_1 CA_{it} + \beta_2 DE_{it} + \varepsilon_{it}$$

In this equation, SP is a symbol for estimation of the sports performance variable of Asian football clubs, and CA is a symbol for estimating the Cases-cumulative total of the COVID-19 virus. Also, DE is a symbol for estimation of Deaths- Cumulative total of the COVID-19 virus for the countries whose football clubs were selected. Also, i is cross-sectional, t is time, and ε is an error sentence. Finally, When CA and DE variables equal zero; β_0 is the value of SP . Also, β_1 : holding DE constant, a one unit change in CA results in a β_1 unit change in SP . Finally, β_2 : holding CA constant, a one unit change in DA results in a β_2 unit change in SP . Finally, in this study, after the data were categorized using Excel software, they were estimated by QR method using Eviews software, and the results of QR are confirmed using the BootStrap method.

Results

This section presents the research results to estimate the research equation according to the QR method. Therefore, Table 2 shows the results of the esti-

mated effect of Cases (CA) and Deaths (DE) of the COVID-19 virus on Sports Performance (SP) of Asian football clubs.

Table 2. Estimate results according to Quantile Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Quantile
CA	0.0001	6.47	2.28	0.02**	0.1
DE	-.002	0.001	-1.94	0.05**	
CA	0.0001	6.72	2.91	0.004**	0.2
DE	-0.003	0.001	-2.95	0.003**	
CA	0.0001	7.31	2.13	0.03**	0.3
DE	-0.003	0.001	-2.51	0.01**	
CA	0.0001	8.43	2.07	0.04**	0.4
DE	-0.003	0.001	-2.39	0.01**	
CA	0.0001	4.94	2.61	0.009**	0.5
DE	-0.002	0.001	-2.19	0.02**	
CA	0.0001	6.43	2.70	0.007**	0.6
DE	-0.003	0.001	-2.51	0.01**	
CA	0.0003	7.15	5.46	0.0000**	0.7
DE	-0.006	0.001	-4.73	0.0000**	
CA	0.0003	6.88	5.57	0.0000**	0.8
DE	-0.007	0.001	-4.97	0.0000**	
CA	0.0002	0.0001	2.04	0.04**	0.9
DE	-0.0001	0.002	-2.13	0.03**	

** effect of CA and DE on SP in level 0.05 ($p < 0.05$)

Source: own research.

Table 2 includes the effect of the cases-cumulative total of the COVID-19 virus (CA) and deaths-cumulative total of the COVID-19 virus (DE) on Sports performance (SP). The first column shows the coefficients, and the fifth column shows a significant level (Prob. = $P < 0/05$) for the effect of CA and DE on SP. The last column shows the value of Quantile for each estimate. Also, the third and fourth columns show respectively the values of Standard Error and t-Statistic. According to Table 1, because the coefficient estimates (i.e., degree of dependence) for each quantile are equal (for both effects of CA on SP and the effect of DE on SP), the dependence structure is said to be constant. The estimates show a constant dependence that is equal in the lower tail (0.0001) compared to the upper tail (0.0002) for the panel of the effect of CA on SP. Also, there is a constant dependence that is equal in the lower tail (-0.002) compared to the upper tail (-0.0001) for the panel of the effect of DE on SP. In addition, the mid-point

(median) estimation is 0.0001 for the effect of CA on SP and the mid-point (median) estimation is -0.002 for the effect of CA on SP.

Based on this result, the degree of dependence between COVID-19 virus cases (CA) and sports performance (SP) is equal in all quantiles for the selected period. Also, the degree of dependence between death from the COVID-19 virus (DE) and sports performance (SP) is equal in all quantiles for the selected period. The positive estimates indicate an increased effect of COVID-19 virus cases (CA) on sports performance (SP), and the negative estimates indicate a decreased effect of death from the COVID-19 virus (DE) on sports performance (SP). The positive estimate, equal in all quantiles for the effect of COVID-19 virus cases (CA) on Sports Performance (SP), shows that COVID-19 virus cases (CA) have a constant positive effect on sports performance (SP). The negative estimate, equal in all quantiles for the effect of death from the COVID-19 virus (DE) on Sports Performance (SP), show that death from the COVID-19 virus (DE) on Sports Performance (SP) has a constant negative effect.

Discussion

COVID-19 has had a tremendous impact on the world's society and economy. This subject also applies to European football; the continent's largest professional sports ecosystem has millions of employees in football-related jobs and even more people emotionally attached to this sports discipline [5]. Since the appearance of the COVID-19 epidemic, much research has been done on the effect of COVID-19 on sport. COVID-19 has interrupted professional sports events in most countries and created many problems for this lucrative industry; therefore, many researchers have done research in this area. Football is a lucrative sector and industry for most countries, especially in Asia, which was affected by this virus. Therefore, there are a lot of studies in Asia on the effect of COVID-19 on the performance of football athletes. Most of these researchers study this subject through interviews, questionnaires, or in the form of descriptive reviews and experimental research methods. For example, Hoang, Al-Tawfiq, and Gautret state that to control the COVID-19 outbreak, Japan postponed the Tokyo 2020 Olympics to 2021. Given the high contagiousness of the disease and the epidemiology of COVID-19 in Japan, this decision was appropriate and essential to safeguarding athletes. COVID-19 is a significant problem for Japan, involving massive financial losses and a lost opportunity for athletes, coaches, and instructors [20]. Also, Dergaa et al. reviewed the guidelines, policies, and preventative measures implemented in organizing the Amir Cup Football Final of Qatar, which hosted about 20,000 fans. These preventative measures show that it is possible to organize a significant football match held outdoors with

thousands of supporters. They suggested a model for the process of organizing significant sporting events with spectators in times of COVID-19 [12]. Chen and Horne list critical aspects of the Covid-19 pandemic-related developments and indicate how these may have altered future training and development processes of referees in the AFC for good [8]. Takata and Hallmann used data collected from baseball and football fans in Japan during the Covid-19 pandemic. They analyzed the moderation effect of sports fans' match attendance on the relationship between nostalgia and revisit intention. The results revealed that nostalgia for the environment stimulated non-attending fans to return to stadiums [37]. So, these research types do not show accurate statistics of the COVID-19 status in a spectrum or continuum. Therefore, this study estimated the effect of COVID-19 on the sports performance of Asian football clubs with the quintiles regression econometric approach. For this purpose, this study used panel data for Asian football clubs and their related countries. Therefore this study can provide accurate information about the death and case rate of COVID-19 in Asian countries. This study shows that the mean of COVID-19 cases from April to December 2020 is 145870/4 cases, and these numbers fluctuate between 1887 – 1206373. Also, the countries' mean of death from COVID-19 is 5028/53, and these numbers fluctuate between 8 – 10012/20 cases in Asian countries (see Table 1). Also, the trend of cases and deaths from the COVID-19 virus was increasing in all countries from April to December of 2020, but Iran and Saudi Arabia, respectively had the biggest deaths and cases-cumulative total of the COVID-19 virus in this period (see Figure 1 and 2).

The study also provides exact information on the Asian football clubs' performance during COVID-19 by studying the time series of sports clubs' points. The results show that the trend of points of some clubs was increasing although the trend of points of some other clubs was declining; also, the trend of points of some clubs was volatile (see Figure 3).

After providing descriptive statistics, this study estimated the effect of cases and deaths from COVID-19 on sports performance using the quintiles econometric regression approach. The results show that the degree of dependence between cases and deaths from COVID-19 and sports performance (SP) is equal in all quantiles. However, the effect of COVID-19 cases on sports performance is positive and weak, and the effect of deaths from COVID-19 on sports performance is negative. These findings mean that deaths from COVID-19 decrease sports performance in Asian football clubs. The results are in line with researches of Bisciotti et al.; Bond et al.; Davis et al.; Dergaa et al.; Dönmez et al.; Mohr et al.; Sekulic et al. [6, 7, 11, 12, 13, 27, 33]. For instance, Sekulic et al. show that there is a significant decrease in the physical performance in matches after the COVID-19 lockdown for players in all playing positions [33]. Mohr et al. reason that due to the multifaceted physiological demands in elite football, long

recovery requirements after match-play, and an upcoming reality of many games within a short period, elite football players, managers, and clubs may face extraordinary challenges associated with returning to play under the current circumstances [27]. Bisciotti et al. provide practical recommendations for preparing training sessions for professional footballers returning to sport after the lockdown [6]. Bond et al. presented the analysis of the effect of fans' return to football competitions and its impact on the income of football clubs [7]. Davis et al. showed that written emotional disclosure can promote athletes' mental health and performance readiness during the COVID-19 pandemic [11]. Bond et al. and Dergaa et al. believed that football competitions without spectators caused financial problems for football clubs [7, 12].

The COVID-19 pandemic has changed the status of football matches around the world. Several competitions and leagues were canceled or postponed. Players train in solitude. In the second stage, players start training in small groups with strict contact restrictions. Their return to competitive play might occur only after a few weeks of typical team training preparation. These circumstances are likely to impact football performance and injury risk in the upcoming competitions [27]. The return to sport for professional football players will follow a forced lockdown never experienced before and longer than the regular annual season break [6]. The COVID-19 pandemic forced elite football leagues into extended breaks. Followed by the prompt resumption of competition, inadequate periods of on-pitch football-specific training may underlie the increased injury incidence reported following a restart in a non-peer-reviewed report [10]. Also, COVID-19 has sent a shockwave into society and sport. As a result, sport and football resuming without spectators – fans or supporters, has brought several financial issues that have threatened the sustainability and future of many clubs [7]. Also, the incredible effects of the coronavirus disease in 2019 (COVID-19) pandemic have negatively impacted many athletes' mental health, reflected in numerous reports on depression as well as symptoms of anxiety. Disruptions to training and competition schedules can induce athletes' emotional distress, while concomitant government-imposed restrictions (e.g., social isolation, quarantines) reduce the availability of athletes' social and emotional support [11]. Maintaining regular physical activity and routinely exercising in a safe home environment is one of the essential strategies to ensure a healthy mental state [13]. Finally, as football leagues shut down, revenues dry up, presenting acute cash flow challenges for the game. No club will be immune to financial repercussions from the crisis, but some will be better protected than others. COVID-19 has created a significant financial disparity between the professional leagues [41]. Sports and football competitions without spectators and fans generate many financial issues that threaten the sustainability and future of many football clubs [7]. Therefore, the three components of clubs' income, psychological

and mental issues and injuries after quarantine have been the most important factors negatively impacting the sports performance of football players.

Conclusion

The COVID-19 epidemic has had different effects on different parts of the world. Sport was also affected by COVID-19. This virus began in Asia, China and then spread to other Asian countries, causing many economic, social, and cultural problems. Asian football was one of the essential sports activities affected by the COVID-19 epidemic. All football leagues in different Asian countries were closed, the activities of sports clubs during COVID-19 were stopped, and the Asian Champions League, which was in the group stage of the 2020 season, was stopped. After a while, the AFC decided to hold the tournament in Qatar. Also, some domestic leagues started their activities, but many countries could not resume their leagues. The resumption of football matches in Asia was difficult for Asian football clubs during COVID-19, and they faced problems such as not earning revenue on the match day, injuries to athletes, and psychological and mental problems of Asian football players. Asian football clubs were deprived of their income of the match day, such as ticket sales and advertising. Many clubs were even reluctant to hold matches and waited for these events to be postponed. Moreover, football players were quarantined for two weeks if they tested positive for COVID-19. When they returned to a sporting event, they did not perform well due to psychological and mental issues such as stress, anxiety, and depression. Additionally, these football players were exposed to injury due to lack of training after returning to sport, and consequently suffered severe injuries.

Thus, the three most important factors, i.e. lack of club income and revenue during COVID-19, post-quarantine injury, and psychological and mental problems are the most acute effects of COVID-19 on the sports performance of Asian football clubs and players. Also, an increased COVID-19 death and case rate in a given country would lead to worsened sports performance, which was confirmed by the results of this study. Our research showed that an increase in COVID-19-related deaths was detrimental to sports performance in Asian football clubs. Therefore, Asian football clubs should use the right solutions to improve their sports performance during COVID-19. To receive the revenue of the match day, they can provide a safe background for holding competitions with spectators by meeting health requirements, timely vaccinations and modeling from countries such as the United Kingdom. Also, players with positive COVID-19 tests who are in quarantine should be prepared to return to matches by psychologists and dedicated training coaches.

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