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Sports, economic performance and FDI:
The impact of hosting different sports mega-events on economic growth and foreign direct investment in developed and developing countries, 1970 – 2016.

by

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Abstract

In this paper, the effect hosting a mega sports event has on economic growth and the inflow of foreign direct investment is investigated over the period 1970 – 2016. This paper differentiates between six different mega sports events. Furthermore, it also investigates whether hosting mega sports events in developing countries has a different impact on economic growth and the inflow of foreign direct investment than if such an effect were hosted in a developed country.

Keywords:

Mega Sports Events, Economic Growth, Foreign Direct Investment, Summer Olympics, Winter Olympics, FIFA World Cup, UEFA European Cup, African Cup of Nations, Copa America, Longitudinal Investigation

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I. Introduction

Every time a mega sports event is about to commence, there is a recurrent debate in society and the media about whether hosting the Olympic Games, and other mega sport events like the FIFA World Cup, are worth hosting for the host country from an economic perspective. The debate often concerns the rather high costs – and (potentially) high benefits – that coincide with hosting a major sporting event. Often, such a debate develops along the same lines and eventually a consensus is not reached. Proponents of hosting sports mega-events point to the additional income generated by tourism (Preuss, 2000; Bohlemann & Van Heerden, 2005; Pop et al, 2016; Lyu & Han, 2017), the additional spending on restaurants and bars, generally putting the country (or city) on the map (Preuss, 2000; Rose & Spiegel, 2009), the benefits that accrue from the infrastructure investments that are needed to get the country ready for the mega sports event (Kim et al, 1989; Jakobsen et al, 2013), and of course the non-economic benefit that a sports tournament of international allure is fun to host. Opponents generally reference the high organizational costs that coincide with hosting such an event, that a better use can be found for taxpayer's money (Siegfried & Zimbalist, 2000; Baade & Matheson, 2004), and that the economic benefits are generally – often accidentally – exaggerated (Baade & Matheson, 2004; Matheson & Baade, 2004; Owen, 2005; Whitson and Horne, 2006; Porter & Fletcher, 2008; Preuss, 2011). The arguments in favour of and against hosting sports mega-events will be revisited in much more detail in section II.

There is no question that hosting the Olympics – or any mega sports event for that matter – is expensive. However, the purpose of this paper is not to offer a cost-benefit analysis of hosting mega sports events. Instead, the sole focus of this paper will be on the potential (macro-)economic benefits of hosting mega sport events. In particular, this paper investigates the effect hosting of different sports mega-events on economic growth and foreign direct investment (henceforth: FDI). The mega sports events that are distinguished in the analysis are: the Summer Olympics, the Winter Olympics, the FIFA World Cup, the UEFA European Cup, the African Cup of Nations, and the Copa America.

There are two ways in which this paper contributes to the existing literature regarding the economic impact of mega-sports events. The first way in which this paper contributes to the literature is that, in line with Jakobsen et al (2013) who found that hosting the Olympic Games and hosting the FIFA World Cup impacted FDI differently, the paper investigates whether different mega sports events have a different impact on the economy of the host. It is not unthinkable that hosting, say, the FIFA World Cup has a positive effect on economic growth or FDI, whereas hosting the Winter Olympics has no effect. Second, this paper addresses the question whether mega sports

events have a different impact on the economy of developing and developed countries. This distinction is relevant because developing countries may be able to – in a matter of speaking – play their way to prosperity, while hosting a sports mega-event may be a net burden to already developed economies. Conversely, the opposite may also be true: hosting sports mega-events may be a burden to developing nations while they provide developed nations with economic opportunity. Hence, the following research questions will be addressed in this paper:

1. *Does hosting sports mega-events boost economic growth, and do different mega sports events impact economic growth differently?*
2. *Do sports mega-events attract foreign direct investment, and is there a difference between sports mega-events in the capacity to attract FDI?*
3. *Do sports mega-events have a different impact, in terms of economic growth and foreign direct investment, on developing countries than on developed countries?*

To answer these research questions different multiple regression models are constructed, which are then tested on a sample of 48 countries over the period 1970 until 2016.

Even though the method and empirical model utilized in this paper build heavily on Jakobsen et al (2013) – and Tien et al (2011), for that matter – it should be noted that the analysis conducted in this paper does extend on these papers in several ways. These differences boil down to a slightly longer period, a larger variety of sports mega-events being under investigation (both of which also translate into a larger sample), the fact that both economic growth and foreign direct investment are investigated, and the fact that this paper devotes special attention to the distinction between developed and developing countries, and how they are affected by organizing different mega sports events.

Providing answers to the aforementioned research questions is important from an academic perspective since the paper attempts to fill gaps in the academic community's current knowledge regarding the subject of the economic benefits of sports mega-events, in terms of driving economic growth as well as attracting FDI. Furthermore, the investigation conducted in this paper may provide policy-makers with some insight into whether and when to bid for the right to host mega sports events. Therefore, the results obtained in this paper may be valuable from both an academic and a policy perspective.

The remainder of this paper is organized as follows: first, in section II, the existing literature on the subject of the relationship between mega sports events, foreign direct investment, and economic growth will be reviewed. In the process some testable hypotheses are formulated which correspond to the aforementioned research questions. Then, in section III, the data and methodology used in this paper will be described. The econometric models, which are used to test the hypotheses,

will also be build in this section. Next, in section IV, the results obtained by estimating different multiple regression equations will be presented and briefly discussed. In section V, the paper's limitations will be discussed and some recommendations for further research will be made. Finally, in section VI, some conclusions will be drawn regarding the effect of hosting sports mega-events on economic growth and FDI. Some conclusions will also be drawn about whether hosting a sports mega-event has a different economic impact in developed and developing countries.

II. Literature review

As mentioned in the previous section, the research questions this paper addresses are: *"Does hosting sports mega-events boost economic growth, and do different mega sports events impact economic growth differently?, "Do sports mega-events attract foreign direct investment, and is there a difference between sports mega-events in the capacity to attract FDI?",* and *"Do sports mega-events have a different impact, in terms of economic growth and Foreign Direct Investment, on developing countries than on developed countries?"*. Before the hypotheses which correspond to these research questions are developed, the existing literature regarding the economic impacts of mega sports events will be reviewed.

Despite mixed results obtained in economic impact studies which investigate mega-sports events like the Olympic Games, hosting sports mega-events remains as popular as ever. Cities and countries continue to compete for the honour of hosting such an event (Preuss, 2000; Whitson & Horne, 2006; Rose & Spiegel, 2011; De Nooij & Van den Berg, 2017). In fact, in the wake of the Information and Communications Technology (ICT) revolution – and the perceived commercial success of the 1984 Summer Olympics in Los Angeles, USA – the enthusiasm for hosting sports mega-events has actually increased in recent years (Whitson & Horne, 2006; Tien et al, 2011). The reason why hosting, for example, the Olympics – in spite of the substantial costs associated with hosting such an event – has (relatively) recently become more popular is that advances in ICT made it possible for host cities to reach a global audience, which corresponded with an increase in television revenues and a high(er) influx of corporate sponsorship money (Whitson & Horne, 2006).

In order to get a clear sense of exactly what kind of events are meant by "mega sports events", it is of paramount importance to define the term. Even though, there is no consensus in the literature concerning which criteria sporting events need to full fill in order to qualify as a mega-event (Tien et al., 2010) there is wide agreement among scholars that the Olympic Games and the FIFA World Cup most certainly qualify (amongst others Baade & Matheson, 2004; Bohlmann & Van Heerden, 2008; Jakobsen et al., 2013). When thinking about what the Olympic Games and the

FIFA World Cup have in common a couple of things stand out: they are held periodically, receive a lot of media attention (Ulvnes & Solberg, 2016), attract a large international viewer-ship, and the athletes compete – in part – on behalf of their country. Caiazza and Audretsch (2015) define sports mega-events as "exceptional sporting events with an international scale that are hosted in a particular city". Of course, this definition falls short because mega sports events need not be hosted in one particular city – or even a single country for that matter. In light of this, this paper defines mega sports events as: large international sports tournaments that are hosted periodically in different places, attract media attention and a substantial international viewer-ship.

Mega-sports events are often presented as having huge economic benefits (Whitson & Horne, 2006; Chanaron, 2014). Economists, however, are sceptical about these benefits. In fact, claims that sports mega-events provide a substantial boost to the economy of the host have been strongly criticized (Matheson & Baade, 2004; Whitson & Horne, 2006). There is a stark dichotomy between the optimistic economic forecasts prior to hosting a sports mega-event, and the actual post-event economic impact that is found by economists in event case studies (Baade & Matheson, 2004; Owen, 2005; Porter & Fletcher, 2008; Whitson & Horne, 2006). One reason why scholars are sceptical about the net economic benefits that accrue from hosting a mega-sports event are the significant costs that are associated with hosting such an event. These costs are rooted in the substantial infrastructure investments – stadiums need to be build after all (Baade & Matheson, 2004) – that are required before the event can be hosted, the high operating costs associated with hosting the event itself and the expensive security arrangements (Baade & Matheson, 2004). Hence, the economic benefit of hosting must be substantive in order to overcome the substantial cost. Still, politicians favour hosting mega sporting events despite the discouraging evidence of financial benefits or direct economic gain (De Nooij & Van den Berg, 2017).

According to Preuss (2000), there are several reasons why mega sporting events are hosted. The objectives that countries have in hosting mega-events include: boosting tourism, attracting investment, urban renewal, creating a legacy for sports infrastructure, putting the country on the map, creating new trading partners, showcasing the region, and promoting the political system. With the exception of promoting the country's political system, which is a political argument for hosting an international sports tournament instead of an economic one, the arguments for hosting a sports mega-event will now be reviewed in-depth. Before these arguments are reviewed, however, it is important to note that the investments Preuss (2000) mentions as an objective for hosting a sports mega-event is not the same as foreign direct investment. Rather, it concerns investments by public or private parties in – for example – roads.

An argument that is often coined by proponents of hosting sports mega-events is that such

events increase tourism arrivals. The rationale behind increasing tourism is that tourists spend money and, of course, more tourists spend more money which gives a boost to the host economy (Preuss, 2000; Bohlemann & Van Heerden, 2005). Hence, if tourism arrivals increase this translates into an increase in sales for local businesses like restaurants, cafés, bars, and hotels – not to mention increased sales for, for example, airlines and travel agencies. This is said to boost economic growth due to the multiplier effect (Baade & Matheson, 2004), which is based on the idea that local producers are also the local consumers who spend the additional money they earn on goods and services. Hence, the direct spending increase by tourists induces additional rounds of spending because local businesses that profit from the increase in demand – in turn – see their income increase as well which means their consumption will increase too, and on, and on the virtuous cycle goes (Kahn, 1931; Keynes, 1936, pp. 77-78; Baade & Matheson, 2004).

Even though it makes intuitive sense that mega sports events attract loads of tourists, the actual ability of mega-events to promote tourism and the impact of tourism on the economy of host countries has been disputed by some scholars. While Lyu and Han (2017) and Pop et al (2016) argue that hosting mega sports events generates massive tourism arrivals for the host country, this claim is slightly weakened by Fourie and Santana-Gallego (2011) who do agree that mega sport events promote tourism, but also state that the gain – in terms of tourism – varies depending on the type of sports mega-event, the participating countries, and the season in which the event is held. Whitson and Horne (2006) recognize that tourism may boom during the mega-event, yet the higher number of tourism is difficult to sustain in the years after the sports event. Hence, if say Salt Lake City (USA) hosts the Winter Olympics in 2002 – which they did – the city will enjoy extraordinarily high tourism arrivals in that year, but not in the years following 2002. This is in line with Ulvnes and Solberg (2016), who find that people who are interested in media information about sports mega-events have stronger incentives to visit sports mega-events in the future rather than to visit cities or countries which have previously hosted mega sports events. Ulvnes and Solberg (2016) do, however, acknowledge that people who are more interested in the media coverage the host receives rather than the media attention directed towards the sports event itself say they are likely to visit the host country. Still, it is not too much of a stretch to assume these people would have been inclined to visit the host city, region, or country regardless of whether a sports mega-event was staged there. Although, admittedly, the event could help put the city or country on their radar. Furthermore, whether high numbers of tourism arrivals can be sustained not only depends on the city, region or country which hosted the event, but also on extraneous factors which apply to the countries and regions from which these tourists come (Whitson & Horne, 2006). It is easy to see why: if, for example, the Pound Sterling collapses it will be relatively more

expensive for British tourists to go on holiday to Spain due to the exchange rate.

Moreover, as argued by Baade and Matheson (2004) and Leeds (2008), apart from their propensity to attract tourism there is also a substitution effect surrounding sports mega-events. This substitution effect occurs because of the so-called crowding-out effect (Preuss, 2011), which leads to tourist displacement (Leeds, 2008). Simply put, tourist displacement means that a mega-sports event, like the Olympic Games, alters the visiting decision (potential) tourists make. This tourist displacement can work both ways: it can attract tourists that otherwise would have visited a different country or a different city in the same country, but can also repel tourists that would otherwise have visited the event site. Leeds (2008) gives an example of the latter, he noticed that during the 2002 Winter Olympics in Salt Lake City the number of ski resort bookings in nearby cities went up. Hence, tourists that otherwise would have spend their winter break skiing in Salt Lake City, were now crowded-out by the people visiting the Olympic Games. Baade and Matheson (2004), on the other hand, provide an example of the way in which sports mega-events can draw tourists in at the expense of cities in the (relatively) close vicinity. According to them, a mega-event in, say, Munich will mean that more people will visit Munich but this coincides with lower rates of hotel booking in Berlin or Hamburg. In other words, people who would otherwise have visited Berlin or Hamburg now decided to go to Munich and visit the sports mega-event considering they were planning to go to Germany anyway.

It could also be disputed whether tourism, in itself, provides a robust basis for economic development, and therefore for economic growth. Sinclair (1998) reviews the effect a large tourism sector – or attracting large numbers of tourists – has on developing countries. On the one hand, tourism can contribute to economic development because it provides hard currency in the economy which can help to alleviate a foreign exchange gap and therefore help finance the import of capital goods (Sinclair, 1998). Furthermore, and perhaps more relevant to hosting mega-events per se, it increases the number of jobs, and consequently GDP and income. If employment and income go up this will also indirectly increase the tax revenue for the government, which in turn, could be spend on providing public goods like roads. Hence, tourism can in theory contribute to economic development.

On the other hand, however, a large influx of tourists also requires the infrastructure (like airports and roads) to be in place and well maintained. Thus, the (developing) country will need to increase its expenditure on these (specialistic) public goods, using money it may not have (Sinclair, 1998). Moreover, tourism requires various types of (skilled) labour and investments in human capital (Sinclair, 1998). The issue here is that, a) skilled labour may not be widely available, and b) people with a lot of human capital may be of more use if deployed in more productive activities.

Related to this argument is that a lot of jobs in tourism are low skilled service jobs. While they may offer a way for young people to earn a quick buck, this may impede them in getting a tertiary education, essentially causing them to be trapped in low-paying service work. Furthermore, the expenditure by foreign tourists may alter domestic consumption patterns, and in the worst case act inflationary (Sinclair, 1998). Finally, Sinclair (1998) worries that developing countries may be ill-equipped to deal with demand variations which are inherent to seasonal tourism. This may be no different for (developing) countries which host sports mega-events. Thus, even if sports mega-events succeed in attracting loads of tourists, tourism in itself may not be such a blessing.

A second argument that is often used by proponents of hosting sports mega-events is that the infrastructure investments which coincide with hosting such an event have a positive impact on the economy. This could be because of the benefit of the government spending itself, because such infrastructure projects attract investments, and because of the inherit merit of the infrastructure once it is in place. Frankly, three types of infrastructure projects can be identified in the period leading up to the sports mega-event (Kim et al., 1989). Firstly, there are the infrastructure projects which are essential for hosting the event – for example the Olympic village that needs to be build for the athletes that compete in the Olympic Games. Secondly, there are direct investment projects which are essential for the event, but which can be utilized after their completion – stadiums, for example. Thirdly, there are indirect investment projects in social infrastructure – for example roads and hotels – which are not directly related to the sports mega-event but which create a favourable environment for their success (Kim et al., 1989). The characterization of different infrastructure projects by Kim et al (1989) is in line with the distinction between primary (sports and leisure; i.e. the stadiums and indoor arena's), secondary (housing and recreation; i.e. the athletic village and training facilities), and tertiary (work and traffic; i.e. airports and roads) structural demands of sporting events on cities hosting the Olympic Games as identified by Jakobsen et al (2013).

The idea is that investments in infrastructure boost economic growth in the short-term because the building process itself creates jobs. Essentially, the argument here resembles the multiplier argument that has already been discussed. Workers are needed in order for the stadiums to be build, and in return for building the stadium they receive a wage x. The worker spends part y of wage x on goods and services, which means demand has increased. Due to the increase in demand supply will increase because the local producers realize they can make more profit if they sell more, business is good, more people are employed, and everyone is happy.

Infrastructure investments can also boost economic growth in the long-term because of the economic benefits that derive from the infrastructure being in place. For example, because a major sporting event is scheduled to be hosted in a large city, a new road is build to smooth the traffic

flows from the one sports site – which is in economic centre A – to the other event site – in economic centre B. After the sporting event has concluded, the new road will continue to generate economic activity because it shortened the travel time between two economic centres within the city. Of course, the same holds for a new highway build to connect two cities in a country in which an international football tournament is hosted.

Even though these arguments hold in theory, the positive impact of infrastructure projects on the economy is not as clear cut as it may seem. Particularly the long-term economic impact of the infrastructure investments depends largely on the meaningful usage of the products of these expensive infrastructure projects. In reality, this has repeatedly proven to provide a challenge for the sports tournament's host (Pop et al., 2016). Too often stadiums go unused, newly build hotels stay empty, and Olympic villages turn into ghost towns in the wake of a sports mega-event, even though they have cost huge sums of taxpayer's money to build. In other words, if the host country, region, or city cannot come up with a realistic and meaningful contingency plan with respect to how to utilize the infrastructure after the event, most of the newly build infrastructure should be considered a net cost rather than a benefit (Matheson & Baade, 2004; Rose & Spiegel, 2011).

The rationale behind urban renewal, which is one of the objectives articulated by proponents of hosting a sports mega-event as identified by Preuss (2000), is very much in line with the rationale behind the long-term benefits of infrastructure investments. According to Clark and Kearns (2016), host cities (increasingly) combine the staging of a multi-sports event with the regeneration of run-down areas and the creation of "social legacy". When Barcelona (Spain) hosted the 1992 Summer Olympics, it took the opportunity to give the old port area a make-over, and when Sydney (Australia) hosted the Summer Olympics in 2000 it did the same with a polluted bay (Clark & Kearns, 2016). Other examples of cities which combined hosting a mega sports event with an agenda of urban renewal include the 2010 Winter Olympics in Vancouver (Canada), the 2012 Summer Olympics in London (United Kingdom), and the 2014 Commonwealth Games in Glasgow (United Kingdom) which were used as a catalyst for the physical, social, and economic renewal of its East End (Clark & Kearns, 2016). Hence, hosting a sports mega-event can provide the governing body of a city or country with the opportunity to regenerate run-down areas – which in most cases is not only necessary but also welfare improving. Thus, one might call combining urban renewal with hosting a mega-event the two birds, one stone approach.

Preuss (2000) also states that sports mega-events are hosted for the purpose of putting the country (or city) on the map, boosting trade, and showcasing the region. According to Rose and Spiegel (2009; 2011) these objectives are indiscriminately related to the signalling function of hosting sports mega-events. Rose and Spiegel (2009) first discovered the importance of the

signalling function when they found evidence that hosting a mega sporting event has a positive effect on that country's exports, and that trade is roughly 30 percent higher for countries that have hosted the Olympic Games. Of course, since the vast majority of countries which have hosted the Olympic Games are developed, rather than developing countries, it could also be the case that these countries were already more open and therefore traded more to begin with – this is not necessarily caused by the act of hosting the Olympics. In other words: correlation does not imply causation. Rose and Spiegel (2009), too, recognize that hosting a sports mega-event may not explain why more trade is observed for these countries and come up with a different explanation. Because they observe that unsuccessful bids to host the Olympics have a similar positive effect on exports, they attribute the Olympic effect on trade to the signal the country sends when bidding to host the Olympic Games, rather than the act of actually holding a sports mega-event.

The idea is that by hosting, or even bidding for, a sports mega-event the country is signalling that it is ready to intensify its participation on the world stage. Hence, the country signals that it intends to pursue more open trade policies, and consequently trade increases (Rose and Spiegel, 2011). Even though the explanation that hosting a sports mega-event increases a country's openness to trade, this does not really explain why already open economies bid for hosting too (Rose & Spiegel, 2011), the observed positive effect on trade is undeniable, and hosting a mega-event undoubtedly puts a country on the map.

In addition to increasing trade, signalling openness and showcasing the region may also increase the amount of foreign direct investment the country attracts. In fact, the link between openness and foreign direct investment has long been established in the literature (Asiedu, 2002). Hosting sports mega-events may increase the inflow of FDI through the same mechanisms that link hosting such events to an increase in trade. Attracting FDI is a favourable outcome in itself because it has – among other things – been found to play a key role in the diffusion of technologies (Barrell & Pain, 1997), and to be a potentially vital driver behind a country's economic performance (Jakobsen et al, 2013). Hence, if hosting sports mega-events can contribute to attracting foreign direct investment doing so may be a worthwhile endeavour.

An argument in favour of hosting that was not covered by Preuss (2000) is provided by De Nooij and Van den Berg (2017), who state that hosting a mega sporting event makes the country's residents proud and happy which means such events are welfare improving. This argument is often neglected in the literature because economists have a hard time quantifying welfare, and because politicians (and other proponents) – paradoxically – hardly ever use this argument to justify a bid for a mega sports event (De Nooij & Van den Berg, 2017).

Using a computable general equilibrium model for the Bohlemann and Van Heerden (2005)

predict that hosting a sports mega-event, in this case the 2010 FIFA World Cup, will have a positive impact on the South African economy in terms of GDP and employment. Hence, Bohlemann and Van Heerden (2005) conclude that: *"it can be concluded with relative certainty that the impact of hosting a mega-event on the South African economy is beneficial towards achieving higher economic growth and development."*. However, the paper by Bohlemann and Van Heerden (2005) is an example of a pre-event economic forecast study, and as we know from Baade and Matheson (2004), Owen (2005), Porter and Fletcher (2008), and Whitson and Horne (2006) such pre-event economic forecast are generally too optimistic about the economic prospects. There are a number of technical reasons which may explain why pre-event forecasts have been overly optimistic.

First of all, the actual benefits of sports mega-events may be exaggerated because the increase in direct spending that coincides with the large number of tourist arrivals may actually be a "gross" instead of a "net" measure (Baade & Matheson, 2004; Matheson & Baade, 2004) The reasoning behind this is that direct spending is measured by aggregating the average (expected) spending by the people who attend the event. The issue is, however, that people who life in the host country or city may choose to adjust their spending behaviour in order to avoid congestion. This can easily be illustrated with an example. Say Amsterdam (The Netherlands) is set to host an international sports event, then the direct spending increase which is used to forecast the economic benefit for the city of Amsterdam is calculated by adding the average spending of the additional tourists that will come to the city due to the event. This is likely to overestimate the actual spending that will occur because people who otherwise would have visited Amsterdam may now decide to go to, say, Antwerp (Belgium) instead (i.e. tourist displacement; Leeds, 2008), and the locals that otherwise would have gone out for dinner may decide to stay in (decreasing the amount of spending) or spend their time in the country-side to escape the busy tourist-ridden city. Either way, due to this crowding-out effect the predicted level of direct spending necessarily overestimates the level of spending that can reasonably be expected (Baade & Matheson, 2004; Matheson & Baade, 2004; Preuss, 2011).

Secondly, as the direct spending during the event is overestimated, so too will the benefits that accrue due to the aforementioned multiplier effect be (Baade & Matheson, 2004; Matheson & Baade, 2004). Furthermore, leakages should also be taken into account. The size of these leakages necessarily depend on the state of the economy and whether the extra income that is earned stays within the community (Baade & Matheson, 2004). For example, if part of the additional spending is spend on hotels that are part of an international chain, then part of the income will flow to the hotel's headquarters. Consequently the multiplier effect will be smaller than anticipated.

Thirdly, in order to predict ex ante economic benefits standard, user-friendly, regional input-

output models are used (Porter & Fletcher, 2008). The user just has to enter the data, for example the expected increase in demand, into the input-output model and it returns predictions regarding changes in income, taxes, and employment for the region. However, the problem with using one-time events to estimate long-run models is that this violates the assumptions made in these regional input-output models. For instance, these models assume fixed factor prices while in reality factor prices go up in response to the temporary demand shock (Porter & Fletcher, 2008). Naturally, this will cause the economic merit of such an event to be grossly overstated. A particularly painful example of one such overestimation is provided by the Center for Business Research (1996) which predicted that the 1996 Super Bowl (a three-day American football event) in Phoenix, Arizona (United States) would generate 12,000 full-time(!) jobs in addition to over $300 million in new spending, approximately an amount that is usually spend in this city over a three-year period (Porter & Fletcher, 2008). It goes without saying the economic benefits that were realized in the wake of the 1996 Super Bowl were significantly smaller.

A final issue which causes ex ante predictions to overstate the economic benefits of mega-events has to do with opportunity costs. Sports mega-events are largely financed by public expenditures, but the money has to come from somewhere (Siegfried & Zimbalist, 2000; Baade & Matheson, 2004). As rightfully pointed out by Siegfried and Zimbalist (2000), either of three things must happen in order for the government to be able to (partially) finance a sports mega-event. Government spending on other public goods has to decrease, government borrowing must increase, or taxation has to increase. Of course, substituting expenditures away from (other) necessary public goods that need to be provided by the government will diminish welfare makes intuitive sense. That taxes are disruptive – and reduce disposable income and therefore spending – has been well established in economic theory (Siegfried & Zimbalist, 2000). This leaves us with generating the extra funds required by increasing government borrowing, and therefore probably increasing the government's deficit. As the deficit increases, this means that either the taxes have to be raised in the future, or expenditures on public goods will have to decrease. As discussed, both these courses of action are unfavourable. Thus, regardless of which way the government chooses to finance the event one thing is evident, it will likely strain (future) economic growth.

Perhaps in light of the opportunity costs of public expenditure argument presented by Siegfried and Zimbalist (2000) – and recycled by Baade and Matheson (2004) – Bohlemann and Van Heerden (2008) tempered their enthusiasm for the 2010 FIFA World Cup which was (set to be) hosted in South Africa. While they predicted that hosting a mega-event would be beneficial for the South African economy in 2005, Bohlemann and Van Heerden (2008) stated that in order for the 2010 FIFA World Cup to have a favourable effect on the South African economy in the short-term

the financing should be shared between higher present taxes, revenue generated from future economic growth, and private investment.

While most studies, like Ritchie and Aitken (1984), Kim et al (1989), Spilling (1998) and Porter and Fletcher (2008) are case studies which investigate the (economic) impact of particular mega sports events, longitudinal approaches to the relationship between economic performance and hosting sports mega-events are relatively rare.

Taking a longitudinal approach is important because it might very well be the case that results obtained from a case study of one or two particular mega sports events are not generalizable. The experience of Montreal (Canada) in hosting the 1976 Summer Olympics may be vastly different than the experience of Barcelona (Spain) in hosting the 1992 Summer Olympics. The different experiences could be explained by any number of factors, including – but not limited to – differences in economic conditions when the sports mega-event was hosted, differences in legacy of sports infrastructure (i.e. if a city or country has already hosted a (similar) sports mega event before, or regularly hosts sports events, it may not need to invest (a lot) into sport specific infrastructure since it is already in place), or the city's/country's ability to attract tourists. Therefore, a longitudinal approach is useful because it ensures the comparability and generalizability of the results.

Furthermore, only through a longitudinal approach it becomes possible to decipher long-run trends in the data. For example, Kim et al (1989) investigate the impact hosting the 1988 Summer Olympics in Seoul (South Korea) had on the Korean economy. Yet, since their paper was published shortly after the Olympic Games were hosted, Kim et al (1989) cannot possibly have taken any post-game effects on the South Korean economy into account. This is where a longitudinal approach comes in. By design, taking a longitudinal approach is ideal for investigating long-run effects. It not only allows the researcher to investigate whether hosting a sports mega-event has an effect on the host's economy when the games are held, but also whether such an effect persists after two-years, three-years or even longer after the sports mega-event has long moved on.

One such a longitudinal approach study was conducted by Jakobsen et al (2013), who investigated whether a link exists between hosting a sports mega-event and the amount of foreign direct investment a country receives. Using time-series cross-section data, which covers 1970 until 2009, they researched the relationship between hosting the Olympics or a major football tournament – the FIFA World Cup and the UEFA European Cup – and the inflow of FDI (measured as a share of GDP and then logged) the host country receives in different periods surrounding the year in which the tournament is held. They distinguish between the pre-games phase (from t-4 until t-2), the games phase (t-1 until t+1), and the post-games phase (t+2 until t+4). Whilst controlling for the size of the population, the level of economic development, the size, stability and openness of the

economy, whether or not the country is a member of the World Trade Organisation, and the bursting of the I.T. Bubble in 2001, Jakobsen et al (2013) find evidence that there may be a higher inflow of foreign direct investment in the pre-games phase – i.e. in the years leading up to the sports event – for country's which hosted an international football tournament. Hosting the Olympics, however, does not appear to have an effect on FDI inflows. Hence, this suggests that the economic benefits that coincide with sports mega-events may depend on the type of sports mega-event that is hosted. An interesting result Jakobsen et al (2013) also stumbled upon is that there appears to be a difference between large and small nations in terms of the amount of FDI it receives due to hosting a sports mega-event.

Another longitudinal impact study was conducted by Tien et al (2011). Whereas Jakobsen et al (2013) devote their attention explicitly towards the inflow of foreign direct investment, Tien et al (2011) look at a broader set of (macro)economic indicators. They investigate the impact of hosting the Olympics on GDP performance, employment and investments. Much like Jakobsen et al (2013), Tien et al (2011) distinguish between three distinct periods. They also distinguish between different sports mega-events, but only to the extend that they differentiate between the Summer Olympics and the Winter Olympics. In line with Jakobsen et al (2013), Tien et al (2011) find no evidence of a positive relationship between hosting the Olympics and (foreign direct) investment. They do, however, find that hosting the Olympics has a positive short-term impact on GDP and employment in the period leading up to the event. Furthermore, Tien et al (2011) find that there is a difference between the Summer Olympics and the Winter Olympics. Hosting the Summer Olympics appears to generate a little bit more economic benefit for the host country, which Tien et al (2011) attribute to the fact that hosting the Summer Olympics generally requires more spending.

In light of the literature that has been reviewed in this section and, especially, the results obtained by Tien et al (2011) and Jakobsen et al (2013), the following hypotheses have been formulated to answer the first two research questions:

Hypothesis 1a: *Sports mega-events have a positive impact on economic growth, but only in the period leading up to the mega-event.*

Hypothesis 1b: *Hosting nation-wide football tournaments has a larger impact on economic growth than hosting the Olympic Games.*

Hypothesis 1c: *Hosting the Summer Olympics has a larger impact on economic growth than hosting the Winter Olympics.*

Hypothesis 1d: *Hosting a sports mega-event has no long-term positive effect on economic growth.*

Hypothesis 2a: *Hosting nation-wide football tournaments has a positive impact on foreign direct*

investment, but only in the period leading up to the event.

Hypothesis 2b: *Hosting the Olympic Games has no effect on foreign direct investment.*

Hypothesis 2c: *Hosting a sports mega-event has no long-term positive effect on foreign direct investment.*

To clarify, the nation-wide football tournaments mentioned in hypothesis 1b and 2b concern tournaments like the FIFA World Cup and the UEFA European Cup. What sets these sports mega-events apart from the Olympics is that the Olympics are generally hosted in one single city, whereas such large international football tournaments are hosted in different cities spread across the nation – and are therefore nation-wide. This is precisely the reason these events are hypothesized to have a larger impact on respectively economic growth and foreign direct investment: much of the realized benefit is not concentrated in one single city, as is often the case with the Olympic Games.

The third research question, which entertains the question of whether there is a difference in the way the economies of developed and developing countries are affected by hosting mega sports events, requires some special attention. The above analysis is insufficient to base any kind of hypothesis regarding the impact of mega-sports events on developing countries upon because, according to Matheson and Baade (2004), the experience of developing nations which host mega-events may differ wildly from that of a developed nation. In their paper, Matheson and Baade (2004) investigate whether hosting mega sports events can be a way for developing countries to "play their way to prosperity". In doing so, they offer a comprehensive review of the arguments in favour of – and against – hosting sports mega-events in developing countries.

On the one hand, the expenditure required for infrastructure is likely to be much higher in developing nations because the infrastructure is unlikely to already be in place – and as we know from Rose and Spiegel (2011) these infrastructure investments are often a net cost instead of a benefit. The opportunity costs of capital may be especially high because building a stadium for a sports mega-event may not be the best way for a developing country to spend public money (Matheson & Baade, 2004) After all, this money could also have gone to the provision of, say, health care. Furthermore, industrialized nations may be able to attract more fans to mega-events than developing countries, either because of fear of crime or because the country's residents may not be able to afford attending the event (Matheson & Baade, 2004). Moreover, as has already been discussed, even if the developing country succeeds in attracting large numbers of tourists it may not be able to adequately handle the sudden demand shock and the stress they put on the host country's facilities (Sinclair, 1998).

Yet, on the other hand, there are also arguments in favour of hosting sports mega-events in

developing countries. Due to the widespread availability of labour, the opportunity cost of labour in these countries actually approaches zero (Matheson & Baade, 2004). On top of that, these relatively low wages also serve to lower operating and infrastructure costs. Even though sports specific infrastructure may do little to promote economic growth, sports mega-events often spur spending on non-sports related infrastructure that may provide for future economic development (Matheson & Baade, 2004). Particularly in the case of developing countries, where this infrastructure may be in abysmal state or may not be in place at all, this could provide policy-makers with a rare opportunity to invest in projects that will positively affect future development. Furthermore, hosting a sports mega-event gives to developing a country free publicity (Matheson & Baade, 2004) and, as has been discussed by Rose and Spiegel (2011) sends a signal that the country is ready to increase its openness, which may result in trade deals that are favourable for its development.

Tien et al (2011), who control for country of origin using a 'developed' or 'developing' dummy in their panel regression model, also recognized that countries in different stages of development may be affected differently by the act of hosting the Olympics. Unfortunately, the honour of hosting the Olympic Games has traditionally been bestowed upon advanced economies, with only a handful of exceptions, which means that it is difficult to draw a meaningful conclusion – at least with respect to developing countries – based on the results obtained by Tien et al (2011). As they realize this, too, they state that their data may suffer from the over-concentration of developed countries, and consequently they do not make a distinction between developed and developing countries in their conclusion.

Hence, when formulating a hypothesis for the third research question, *"Do sports mega-events have a different impact, in terms of economic growth and foreign direct investment, on developing countries than on developed countries?"*, the prediction is mostly based upon the discussion provided by Matheson and Baade (2004), and the signalling argument by Rose and Spiegel (2011). In order to answer the this research question, the following hypotheses have been formulated:

Hypothesis 3a: *Hosting a sports mega-event has a larger effect on economic growth in developing countries than developed countries.*
Hypothesis 3b: *Hosting a sports mega-events has no effect on foreign direct investment in either developing or developed countries.*

III. Data and methodology

As this paper focusses on the longitudinal effect of different sports mega-events on economic growth (expressed in GDP per capita growth per annum) and foreign direct investment, the dataset used to test the hypotheses formulated in the previous section consists of countries which have hosted sports mega-events between 1970 and 2016. The different sports mega-events that are investigated in this paper are a mix of multi-sports events and international football tournaments, namely: the Summer Olympics, the Winter Olympics, the FIFA World Cup, the UEFA European Cup, the African Cup of Nations and the Copa America. In appendix A, a comprehensive list of all sports mega-events that are included in the data can be found. Consequently, the countries that are included in the dataset are, in alphabetical order; Algeria, Angola, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Cote d'Ivoire, Ecuador, Egypt, Equatorial Guinea, France, Gabon, Germany, Ghana, Greece, Italy, Japan, Mali, Mexico, Morocco, Netherlands, Nigeria, Norway, Paraguay, Peru, Poland, Portugal, Russia, Senegal, South Africa, South Korea, Spain, Sweden, Switzerland, Tunisia, Ukraine, United Kingdom, United States of America, Uruguay, Venezuela. Thus, the dataset covers 48 different countries. The data concerning macroeconomic indicators like Gross Domestic Product and foreign direct investment is retrieved from the World Bank (World Bank, 2018).

There are a number of reasons the period 1970 to 2016 was selected. The first reason is that most editions of the sports mega-events that are under scrutiny in this paper were held in this period. Particularly the African Cup of Nations and the Copa America, which started – on a significant scale – in respectively 1968 (Knott, 2012, pp. 83-84) and 1975 (Murray, 2015). However, since the Copa America was hosted collectively by a number of countries in Latin America the first few times, the Copa America first shows up in the dataset in 1987 when Argentina hosted the tournament. The Olympic Games, which started in its modern form at the end of the 19th Century, and the FIFA World Cup, which was first hosted in the 1930s have a somewhat longer history. However, due to the First and Second World War these events were, at best, held irregularly, and since they are only held periodically every four years a lot of observations have not been lost by limiting the analysis to 1970 until 2016. The second reason is rather pragmatic, namely that the data for this period is widely available via the World Bank. Furthermore, this period is similar to the period investigated by Jakobsen et al (2013), who looked at 1970 until 2009.

Now that the countries that are covered in the dataset and the period have been discussed, it is time to start building the empirical models that will be used to investigate the research questions. As mentioned, the dependent variables are '*GDP per capita growth*', measured as the annual percentage increase in (the natural logarithm of) Gross Domestic Product per capita, and the natural logarithm of '*foreign direct investment*', which is measured as the share of FDI inflows as a

percentage of GDP. Of course, the variables of interest are the dummy variables that have been created for any sports mega-event (*DSportEvent*), the Summer Olympics (*DSO*), the Winter Olympics (*DWO*), the FIFA World Cup (*DWC*), the UEFA European Cup (*DUEFA*), the African Cup of Nations (*DACN*), and the Copa America (*DCopaA*). Because there are a number of (macroeconomic) variables that may affect GDP per capita growth and FDI, respectively, there are a number of indicators that need to be controlled for in the empirical models. Before identifying these so-called 'control variables' one-by-one and explaining why they are included, it is of paramount importance to explain the overall research design.

The research design for this paper was inspired by Tien et al (2011) and Jakobsen et al (2013). Jakobsen et al (2013) take a longitudinal perspective to investigate the effect of hosting different sports mega-events on foreign direct investments. The authors distinguish between four periods: the games phase (which covers t-1, t, t+1), the pre-games phase (t-4, t-3, and t-2), the post-games phase (t+2, t+3, and t+4) and the full period which ranges from t-4 until t+4. Tien et al (2011) do something similar. They limit their analysis to the Olympic Games, although they do look at a broader set of economic indicators like economic performance, employment and investments, and distinguish between different periods as well. This paper follows Tien et al (2011) and Jakobsen et al (2013) in distinguishing between different periods in which sports mega-events may have an impact on GDP per capita growth (model 1) and FDI (model 2).

As mentioned, there are a number of variables which need to be controlled for because they may influence the dependent variable. Jakobsen et al (2013) control for the country's population, the economic development, stability and size of the economy, openness, foreign direct investment (as a share of GDP), economic growth, the I.T. Bubble (which burst in the early 2000s), and World Trade Organisation membership. The list of control variables utilized by Tien et al (2011) is considerably shorter. They only control for population growth and country of origin (which is basically a dummy variable which indicates whether the host country of a mega sports event is developed or developing). In the econometric models that are estimated in this paper, most of these variables have been controlled for. The only variables that have not been controlled for, in model 1, are the I.T. Bubble and whether a country is a member of the World Trade Organisation.

For the models that estimate the effect of sports-mega events on GDP per capita growth, this translates into the following four variations of the same random effects regression estimation equation:

Model 1a: The games phase

$$GDPpcG_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it}$$

$$+\beta_5 DUEFAgame_{it}+\beta_6 DACNgame_{it}+\beta_7 DCopaAgame_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} lnFDI_{it}$$
$$+\beta_{11} Inflation_{it}+\beta_{12} lnPop_{it}+\beta_{13} PopGrowth_{it}+\beta_{14} lnTrade_{it}+\beta_{15} DDeveloping_{it}+\varepsilon_{it}$$

Model 1b: The pre-games phase

$$GDPpcG_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} lnFDI_{it}+\beta_{11} Inflation_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} PopGrowth_{it}+\beta_{14} lnTrade_{it}+\beta_{15} DDeveloping_{it}+\varepsilon_{it}$$

Model 1c: The post-games phase

$$GDPpcG_{it}=\beta_0+\beta_1 DSportEventpost_{it}+\beta_2 DSOpost_{it}+\beta_3 DWOpost_{it}+\beta_4 DWCpost_{it}$$
$$+\beta_5 DUEFApost_{it}+\beta_6 DACNpost_{it}+\beta_7 DCopaApost_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} lnFDI_{it}$$
$$+\beta_{11} Inflation_{it}+\beta_{12} lnPop_{it}+\beta_{13} PopGrowth_{it}+\beta_{14} lnTrade_{it}+\beta_{15} DDeveloping_{it}+\varepsilon_{it}$$

Model 1d: Full period

$$GDPpcG_{it}=\beta_0+\beta_1 DSportEventtot_{it}+\beta_2 DSOtot_{it}+\beta_3 DWOtot_{it}+\beta_4 DWCtot_{it}+\beta_5 DUEFAtot_{it}$$
$$+\beta_6 DACNtot_{it}+\beta_7 DCopaAtot_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} lnFDI_{it}+\beta_{11} Inflation_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} PopGrowth_{it}+\beta_{14} lnTrade_{it}+\beta_{15} DDeveloping_{it}+\varepsilon_{it}$$

In these multiple regression equations, $GDPpcG_{it}$ represents the Gross Domestic Product per capita growth (in percentages) in country i in year t. The variables of interests are the dummy variables which have been discussed earlier. These sports mega-event dummies indicate whether or not country i hosted a mega-sports event – and which event was hosted in the country – in year t. The other dummy variable, which indicates whether or not a country is developing and is particularly interesting when attempting to answer the third central research question, works in a slightly different way. The dummy variable *DDeveloping* indicates whether country i was classified as developed (0) or developing (1) in year t. In this paper, a country is only classified as developed in year t if its GDP per capita is higher than US$ 12,000. This method is in line with the way in which the World Bank classifies economies as high income countries, although the Bank uses US$ 12,476 as a cut-off point (World Bank, 2016).

Of course a number of control variables have also been included in this empirical investigation. For starters, $lnGDP_{it}$ and $lnGDPpc_{it}$ represent the natural logarithm of GDP and GDP per capita in country i in year t, respectively. Furthermore, $lnFDI_{it}$ represents the natural logarithm of foreign direct investment, as a percentage of GDP, flowing into country i at year t. $Inflation_{it}$,

which – in line with Jakobsen et al (2013) – has been included in order to control for the financial stability of the economy, indicates the hight of inflation (in percentages) in country i in year t. The model also controls for population, with $lnPop_{it}$ – which represents the natural logarithm of the number of people living in country i in year t – and with $PopGrowth_{it}$, which shows the percentage of population growth in country i in year t. Finally, $lnTrade_{it}$ indicates the openness of the economy. This variable has been constructed by adding the total value of the country's imports and exports (for any given year) and dividing it by the country's total GDP (in that year). The value of *lnTrade* may be inflated for some countries due to the double-counting problem caused by trade in intermediate goods (Koopman et al., 2012). However, the double-counting problem really is not a problem here because *lnTrade* is simply a proxy for the openness of the economy. Trading intermediate goods instead of final goods, or importing and exporting the same good – for that matter – does not make the economy less open. Lastly, ε is an error term.

Perhaps it is useful to shed some light on the different periods which are investigated in the different models by making it more tangible with an example. Say, Germany hosted the FIFA World Cup in 2006 (which they did), then the dummy variables *DSportEvent* and *DWC* will get a 1 in 2005, 2006, and 2007 for Germany in the Games-phase (model 1a). Simultaneously, these two dummy variables get the entry 1 for 2002, 2003 and 2004 in the pre-games phase (model 1b), and in 2008, 2009, and 2010 in the post-games phase (model 1c). Finally, the full period model (model 1d) awards these dummy variables an entry of 1 for the whole period covering 2002 until 2010. It goes without saying that the sports mega-events that were not hosted by Germany in 2006 all get zero's for these entries – unless they overlap with another sports mega-event hosted by Germany in a different year.

The models which estimate the effect of sports mega-events on FDI – the net inflows of FDI as a share of GDP, to be exact – look slightly different. Not only because the natural logarithm of FDI is now the dependent variable, but also because – following Jakobsen et al (2013) – the regression equation also needs to control for the lagged version of the dependent variable itself. Adding this control variable to the regression equation makes because it might very well be the case that the FDI inflow in year t depends on the FDI inflow in year t-1. Hence, the random effects regression models estimating the longitudinal effect of sports mega-events on FDI look as follows:

Model 2a: The games phase

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it}$$
$$+ \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it}$$

$$+\beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2b: The pre-games phase

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpre_{it} + \beta_2 DSOpre_{it} + \beta_3 DWOpre_{it} + \beta_4 DWCpre_{it} + \beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it} + \beta_7 DCopaApre_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2c: The post-games phase

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it}$$
$$+\beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2d: Full period

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it}$$
$$+\beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

The multiple regression models designed to empirically investigate the research questions must be so-called random effect models. The reason is that, by design, fixed effect models will automatically control for (binary) differences between the countries within the sample. Consequently, a fixed effect multiple regression model will disregard any dummy variable that is included in the regression equation. Hence, since dummy variables are such a vital part of the research design in this paper, random effect models have been utilized.

Before the aforementioned multiple regression equations can be estimated, it is necessary to address possible statistical problems the models and data may be suffering from because if either – or both – are subject to any of these problems this may result in biased, or even nonsensical, estimates. Common statistical problems – which will now each be addressed in turn – are multicollinearity, heteroskedasticity, and endogeneity.

The first statistical problem that needs to be controlled for is multicollinearity. Simply put, there is multicollinearity in the sample if two (independent) variables are highly correlated with each other. This is problematic because the multiple regression model cannot distinguish between the two variables, which means that the explanatory power of one of the variables may therefore undermine the explanatory power of the other variable (Moore et al., 2011).

To test for multicollinearity the pairwise correlations between every variable that has been included in the random effect multiple regression equations has been constructed. Due to the size of the table the pairwise correlations have not been included in this paper. However, a table which shows the limited number of variables that returned relatively high pairwise correlations has been constructed and can be found in appendix C. Using this table of pairwise correlations a number of variables has been identified for which multicollinearity may be an issue. Because pairwise correlations between *lnGDP* and *lnGDPpc*, *lnGDP* and *lnPop*, *lnFDI* and *lnLagFDI*, and *lnGDPpc* and the dummy variable *Developing* were all over seventy per cent, the empirical regression models may not be able to distinguish between these variables. To solve this potential problem, and hence to prevent possible bias, multiple versions of each multiple regression model – as described above – will be estimated. For example, while in one version both *lnGDP* and *lnGDPpc* will be controlled for, another version will only control for *lnGDP*, and a third version will only control for *lnGDPpc*. For the estimation models in this example one would expect the first version to be most susceptible to issues related to multicollinearity.

The second statistical problem that is addressed is heteroskedasticity. Heteroskedasticity occurs when the variances of the observations are not random, but instead depend on the variables themselves. Hence, if higher values of a certain variable coincide with higher variability of the random errors there is heteroskedasticity in the data (Hill et al., 2012, pp. 299). The big problem with heteroskedasticity is that if the standard errors are not random, one of the conditions of multiple regression analysis is violated (Hill et al., 2012, pp. 300). In the worst case scenario this means that the multiple regression equation – as an econometric tool – is unfit to be applied to the data sample because the estimates will be unreliable.

In order to test for heteroskedasticity a Breusch Pagan / Cook-Weisberg test has been conducted. This particular statistical test tests the null hypothesis of constant variances against the alternative hypothesis that the variances are non-constant. Hence, if the null hypothesis is rejected this would mean that the variances are non-constant and therefore not randomly distributed. The Breusch-Pagan / Cook-Weisberg rejects the null hypothesis of constant variances at the 99.9% confidence level. This indicates that there is (strong) evidence of heteroskedasticity in the data. Because one of the underlying assumptions in the Breusch-Pagan / Cook-Weisberg test is that heteroskedasticity is a linear function of the independent variables (Hill et al., 2012, pp. 305) – which is, of course, not necessarily true – a White's test for heteroskedasticity has also been executed. The White's test, too, provides strong evidence supporting heteroskedasticity. The results are statistically significant al the 99.9% confidence level, after all. In appendix D a comprehensive overview of the results from both the Breusch-Pagan / Cook-Weisberg test and the White's test can

be found. Due to the overwhelming evidence that there exists heteroskedasticity in the data, the random effects models will be estimated using robust standard errors.

The last possible statistical problem that deserves special attention is endogeneity. According to Hill et al (2012, pp. 402), there is endogeneity in the sample if at least one of the explanatory variables is correlated with the error term (ε). Frankly, this only happens if the explanatory variable in question is determined within the system, and is therefore 'endogenous'. Endogeneity is a problem in multiple regression analysis because its presence makes it impossible to determine causality. Establishing causality is difficult enough as it is, but the presence of endogeneity renders the whole practice of attempting to establish causality pointless. The reason is that, due to endogeneity, one cannot tell whether X causes Y, Y causes X, or whether both variables are affected by Z. Thus, multiple regression equations that are found to suffer from endogeneity may be subject to substantial omitted variable bias. One of the reasons endogeneity may be a problem here is that it could very well be the case that GDP per capita growth depends, in part, on the inflow of foreign direct investment, while at the same time multinational enterprises who are the source of the foreign direct investment may in fact choose to invest in that specific country because of its high GDP per capita growth. Then the question becomes: which came first, GDP per capita growth, or FDI? The answer might well be: impossible to tell. In order to test whether endogeneity is a problem in the data, a Durbin-Wu-Hausman test is conducted. The results of the Durbin-Wu-Hausman augmented regression test for endogeneity show that OLS is not consistent for the estimation equations 1a, 1b, 1c, and 1d. In other words, endogeneity is likely to be an issue when estimating these estimation models. In fact, since the variables *lnGDF*, *lnGDPpc*, *lnFDI, lnPop*, *lnTrade*, and *Inflation* all appear to have an endogenous relationship with the dependent variable, *GDPpcG*, all variations of model 1 suffer from a severe endogeneity problem. The Durbin-Wu-Hausman test also shows that models 2a through 2d are OLS consistent, which implies that endogeneity is not an issue for these models.

Taking these statistical issues into account, the multiple regression models that have already been proposed need to be adjusted. As stated, all models will be estimated using robust standard errors to address the issue of heteroskedasticity. Furthermore, different, yet similar, versions of the models will be estimated to cope with the multicollinearity problem.

The endogeneity problem is more challenging to solve. Ideally, model 1 – which takes GDP per capita growth as the dependent variable – would have been estimated using a fixed effect multiple regression model to address the issue of endogeneity. However, due to the nature of the fixed effect model this is simply not an option considering this paper's research questions and the dependency on dummy variables in the research design. Instead, the way in which model 1 is

estimated has to be revisited completely. Inspiration is drawn from Tien et al (2011), who estimate the effect of hosting a mega sports event on economic growth. Their relatively simple econometric model uses economic performance as the dependent variable and a sports mega-event as the independent variable, whilst (only) controlling for country of origin (i.e. whether the host country is classified as a developed or developing nation) and population growth. Since a relatively large number of variables that are ideally controlled for cannot be included in the General Least Squares multiple regression equation due to endogeneity, the model had to be reduced to the form used by Tien et al (2011).

To compensate for the relative simplicity of the model, the model inspired by Tien et al (2011) will be estimated as model 1 in two ways. In the first version, model 1a through 1d, the different time periods will be estimated independently. In the second version, the different phases of the same sports mega-event will be estimated. Thus, the first version of model 1 estimates if, and in which period, hosting mega sports events has an impact on economic growth (per capita), whereas the second version allows us to investigate the effect of hosting specific sports mega-events.

The first version of the different multiple regression models that are used to test hypothesis 1a until 1d look as follows:

Model 1a – Games phase:

$$GDPpcG_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 PopGrowth_{it} + \beta_9 Developing_{it} + \varepsilon_{it}$$

Model 1b – Pre-games phase:

$$GDPpcG_{it} = \beta_0 + \beta_1 DSportEventpre_{it} + \beta_2 DSOpre_{it} + \beta_3 DWOpre_{it} + \beta_4 DWCpre_{it} + \beta_5 DUEFApre_{it} + \beta_6 DACNpre_{it} + \beta_7 DCopaApre_{it} + \beta_8 PopGrowth_{it} + \beta_9 Developing_{it} + \varepsilon_{it}$$

Model 1c – Post-games phase:

$$GDPpcG_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it} + \beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 PopGrowth_{it} + \beta_9 Developing_{it} + \varepsilon_{it}$$

Model 1d – Full period:

$$GDPpcG_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 PopGrowth_{it} + \beta_9 Developing_{it} + \varepsilon_{it}$$

To investigate the effect specific sports mega-events have on GDP per capita growth, the following general form multiple estimation equation will be estimated:

Model 1 – General form estimation equation any mega sports event:

$$GDPpcG_{it} = \beta_0 + \beta_1 MSEgame_{it} + \beta_2 MSEpre_{it} + \beta_3 MSEpost_{it} + \beta_4 PopGrowth_{it} + \beta_5 Developing_{it} + \varepsilon_{it}$$

The full period dummy has been dropped in the above equation – the one which estimates the effect of hosting specific mega sports events on economic growth – because the full period dummy has been constructed by adding the dummies from the pre-games phase, the games-phase and the post-games phase to each other. Thus, this dummy variable is perfectly correlated with the other three dummies which indicate the time-frame. Consequently, the model would not have been able to distinguish the full period dummy from the other time periods. Omitting this variable does not influence the results, because due to its design it is redundant in the above estimation.

The multiple regression equations used to test hypothesis 2a, 2b and 2c, on the other hand, do include the wide variety of control variables that have been discussed previously. Due to the issue of multicollinearity, different variations of the same estimation equation will be estimated. These different variations of the multiple regression equations, which are all variations of model 2, can be found in appendix E. The variation follows a distinct pattern which goes as follows:

- Model 2_I is the full estimation equation, which includes all same variables – including the ones that exhibit high pairwise correlations.
- Model 2_II is basically the same as model 2_I, with the only difference being that the lagged version of foreign direct investment has been omitted here as a control variable.
- Model 2_III is also very similar to model 2_I, but here the variable *lnGDP* has been dropped.
- Model 2_IV can be seen as a combination of model 2_II and model 2_III, since it includes the full estimation equation from model 2_I with the exception of the variables *lnGDP* and *lnLagFDI*.
- Model 2_V closely resembles model 2_III, but here *lnGDPpc* has been omitted instead of *lnGDP*.
- Finally, model 2_VI is largely the same as model 2_V, but in addition to *lnGDPpc* the control variable *lnLagFDI* has also been dropped.

This process is repeated for every time period (i.e. the games phase, pre-games phase, post-games phase, and full period) that is being estimated. In order to clarify, model 2a_I – which estimates the

effect hosting a sports mega-event has on foreign direct investment during the games phase – looks as follows:

Model 2a_I – Games phase; with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

In order to test hypothesis 3a and 3b, two new dummy variables had to be created: *DevSE* and *AdvSE*, which represent the mega sports events hosted in developing countries and the mega sports events hosted by advanced economies, respectively. To test hypothesis 3a, *"Hosting a sports mega-event has a larger effect on economic growth in developing countries than developed countries."*, the following general form multiple regression equation is constructed:

Model 3_I:

$$GDPpcG = \beta_0 + \beta_1 DevSE_{it} + \beta_2 AdvSE_{it} + \beta_3 PopGrowth_{it} + \varepsilon_{it}$$

This estimation equation is largely similar to model 1. Of this multiple regression model, two different variations will be estimated. In the first version (model 3_I), the same distinction in periods has been made for the two dummy variables that are the variables of interest here (i.e. the games-phase, pre-games phase, post-games phase, and the full period). Of course, the variable *Developing* has been dropped because it is implicitly included in the variables of interest. In the second version (model 3_II), the impact of hosting any mega sports event – in respectively a developed or developing country – is estimated over time.

Model 3_II – Developing country:

$$GDPpcG = \beta_0 + \beta_1 DevSEgames_{it} + \beta_2 DevSEpre_{it} + \beta_3 DevSEpost_{it} + \beta_4 PopGrowth_{it} + \varepsilon_{it}$$

Model 3_II – Advanced country:

$$GDPpcG = \beta_0 + \beta_1 DevSEgames_{it} + \beta_2 DevSEpre_{it} + \beta_3 DevSEpost_{it} + \beta_4 PopGrowth_{it} + \varepsilon_{it}$$

To test hypothesis 3b, *"Hosting a sports mega-events has no effect on foreign direct investment in either developing or developed countries."*, the following general form multiple

regression equation is constructed:

Model 4:

$$lnFDI = \beta_0 + \beta_1 DevSE_{it} + \beta_2 AdvSE_{it} + \beta_3 lnGDP_{it} + \beta_4 lnGDPpc_{it} + \beta_5 Inflation_{it} + \beta_6 lnPop_{it} + \beta_7 + \beta_8 lnFDI_{i,t-1} + \varepsilon_{it}$$

Clearly, the estimation equation above bears close resemblance to model 2. There are three different variations of this model in each time period. In version I, the complete estimation equation as described above has been estimated for the corresponding time period. In version II, the same equation will be estimated but this time without the variable *lnGDF*. In the final version – version III – the model is once again estimated but this time without *lnGDP* and without *lnFDI* with a one year lag. The reason fewer versions of model 4 will have to be estimated than for model 2 is that it is not required to control for the dummy variable Developing here. Consequently, the only two variables that are at the root of possible issues related to multicollinearity in model 4 are *lnGDP* and the lagged version of *lnFDI*.

IV. Results

This section shows and discusses the results that have been obtained by estimating the different variations of the four multiple regression models that were introduced in section II. Although the results will be shown and discussed here, the estimates will be interpreted and linked to specific hypotheses in section IV: the discussion.

To test the first four hypotheses, the different variations of model 1 – as discussed in the previous section – have been estimated. The result obtained by running the multiple regression equation for the games-phase (model 1a), the pre-games phase (model 1b), the post-games phase (model 1c) and the full period (model 1d) are shown below in table 1. Subsequently, the results obtained by estimating the models for the individual mega sports events can be found in table 2 (which shows the estimates obtained for Mega sports event, Summer Olympics, Winter Olympics, and the FIFA World Cup) and table 3 (UEFA European Cup, African Cup of Nations, and the Copa America).

Table 1: ***Different periods, model 1***

GDPpcG	**Model 1a**	**Model 1b**	**Model 1c**	**Model 1d**

	Games phase	*Pre-games phase*	*Post-games phase*	*Full period*
Mega Sport Event	0.196 (0.140)	0.035 (0.811)	-0.262* (0.018)	0.060 (0.390)
Summer Olympics	-0.106 (0.531)	0.040 (0.749)	0.304** (0.001)	0.041 (0.575)
Winter Olympics	-0.214 (0.125)	0.050 (0.781)	0.189 (0.072)	-0.044 (0.524)
FIFA World Cup	-0.277 (0.065)	-0.118 (0.333)	0.183* (0.012)	-0.133 (0.080)
UEFA European	-0.172 (0.237)	-0.016 (0.913)	0.266* (0.032)	-0.040 (0.612)
African Cup	-0.356 (0.058)	-0.153 (0.437)	0.208 (0.203)	-0.151 (0.199)
Copa America	-0.201 (0.268)	0.020 (0.900)	0.185 (0.167)	-0.064 (0.599)
Pop. Growth	-0.080*** (0.000)	-0.078*** (0.000)	-0.082*** (0.000)	-0.076*** (0.000)
Developing	0.245* (0.017)	0.245* (0.017)	0.246* (0.023)	0.244* (0.019)
Constant	0.191*** (0.000)	0.185*** (0.000)	0.193*** (0.000)	0.187*** (0.000)
Observations	2115	2115	2115	2115
R^2	0.01	0.01	0.01	0.01

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

The first thing that stands out from table 1 is the weak explanatory power of the statistical model. In fact, for model 1a through 1d, the model only explained roughly 1% of the variance in GDP per capita growth. Hence, this weak explanatory power implies that the variables included in the model do a poor job at explaining the observed variation in the dependent variable. Still, it should be possible to draw a number of conclusions from table 1. For starters, both the control variables have a statistically significant impact on GDP per capita growth – *Population Growth* at the 99.9% confidence level, and the dummy variable *Developing* at the 95% confidence level. For the mega sports events, i.e. the variables of interest in model 1, mixed result was observed.

During the games-phase (model 1a) as well as the pre-games phase (model 1b), the results show that there is no statistically significant relationship between GDP per capita growth and hosting any of the mega sports events. A different result was obtained for the post-games phase (model 1c). It appears as though having hosted the Summer Olympics, the FIFA World Cup, or the UEFA European Cup may be beneficial for economic growth, since the results obtained are positive and statistically significant. Interestingly, the dummy which indicates whether any mega sport event has been hosted also exhibits statistical significance, but the effect on economic growth (per capita) is negative. For the other sports mega-events no statistically significant relationship is found. The same goes for all sports mega-events over the total period (model 1d). Much like in model 1a and 1b, the model finds no evidence of a relationship between economic growth and hosting mega sports events.

Table 2: Specific mega sports events model 1 – ***Mega sport events, Summer Olympics, Winter Olympics, and FIFA World Cup.***

GDPpcG	**Model_DMSE** *Mega Sports Event*	**Model_DSO** *Summer Olympics*	**Model_DWO** *Winter Olympics*	**Model_FIFAWC** *FIFA World Cup*
Games phase	-0.050 (0.360)	0.082 (0.255)	-0.018 (0.636)	-0.104* (0.043)
Pre-games phase	-0.021 (0.674)	0.077 (0.270)	0.077 (0.199)	-0.098 (0.090)
Post-games phase	-0.045 (0.361)	0.072** (0.005)	-0.068 (0.206)	-0.073 (0.297)
Pop. Growth	-0.081*** (0.000)	-0.079*** (0.000)	-0.081*** (0.000)	-0.084*** (0.000)
Developing	0.236* (0.016)	0.244* (0.020)	0.244* (0.022)	0.242* (0.024)
Constant	0.206*** (0.000)	0.183*** (0.000)	0.189*** (0.000)	0.198*** (0.000)
Observations	2115	2115	2115	2115
R^2	0.01	0.01	0.01	0.01

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

With an R-squared of roughly 1%, the models in table 2 have little explanatory power. Yet, much alike the estimates shown in table 1, a number of – careful – conclusions may be drawn. The estimates provide some support to the idea that hosting the Summer Olympics may have a small positive effect on economic growth, particularly in the years directly after the event has been hosted (positive coefficient and a p-value of 0.005). Hosting the Winter Olympics, on the other hand, does not appear to have an effect on economic growth. An interesting result is obtained for the FIFA World Cup, since the model suggests that hosting the FIFA World Cup has a statistically significant effect on economic growth during the games-phase. This effect, however, is negative.

Table 3: ***Specific mega sports events model 1 – UEFA European Cup, African Cup of Nations, and the Copa America.***

GDPpcG	**Model_UEFA** *UEFA European Cup*	**Model_ACN** *African Cup of Nations*	**Model_CopaA** *Copa America*
Games phase	0.027 (0.620)	-0.169 (0.224)	-0.006 (0.955)
Pre-games phase	0.020 (0.663)	-0.133 (0.333)	0.050 (0.603)
Post-games phase	0.010 (0.812)	-0.072 (0.575)	-0.072 (0.484)
Pop. Growth	-0.082*** (0.000)	-0.063** (0.001)	-0.083*** (0.000)
Developing	0.248* (0.023)	0.222** (0.009)	0.248* (0.022)
Constant	0.187*** (0.000)	0.188*** (0.000)	0.189*** (0.000)

Observations	2115	2115	2115
R^2	0.01	0.01	0.01

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

The estimates obtained by estimating the multiple regression equations for the last three sports mega-events – which are all "regional" football tournaments – are shown in table 3. The results suggest that neither the UEFA European Cup, the African Cup of Nations, nor the Copa America have a statistically significant effect on GDP per capita growth.

In all models which estimate the effect of sports mega-events on GDP per capita growth, the control variables *Population Growth* and *Developing* have a statistically significant impact on the dependent variable.

Table 4: ***Games-phase, model 2 – General Least Squares regression***

LnFDI	**M 2a_I**	**M 2a_II**	**M 2a_III**	**M 2a_IV**	**M 2a_V**	**M 2a_VI**
DsportEvent	0.199	0.111	0.201	0.109	0.201	0.109
	(0.442)	(0.512)	(0.454)	(0.519)	(0.454)	(0.519)
Summer O.	-0.052	-10.6	-0.049	-0.106	-0.049	-0.106
	(0.843)	(0.561)	(0.858)	(0.566)	(0.858)	(0.565)
Winter O.	-0.163	0.125	-0.176	0.129	-0.176	0.129
	(0.600)	(0.655)	(0.585)	(0.645)	(0.584)	(0.646)
FIFA W.C.	-0.281	0.274	-0.292	0.275	-0.292	0.275
	(0.310)	(0.125)	(0.308)	(0.123)	(0.308)	(0.123)
UEFA Euro	-0.166	-0.078	-0.165	-0.075	-0.165	-0.076
	(0.568)	(0.806)	(0.580)	(0.813)	(0.580)	(0.812)
Africa Cup	-0.164	-0.144	-0.182	-0.145	-0.182	-0.145
	(0.592)	(0.664)	(0.558)	(0.662)	(0.557)	(0.662)
Copa A.	-0.098	0.224	-0.091	0.224	-0.091	0.224
	(0.748)	(0.306)	(0.771)	(0.307)	(0.771)	(0.308)
LnGDP	-13.738	1.790			0.100**	0.396***
	(0.080)	(0.858)			(0.008)	(0.000)
LnGDPpc	13.884	-1.398	0.100**	0.396***		
	(0.078)	(0.888)	(0.008)	(0.000)		
Inflation	-0.000	-0.000**	-0.000	-0.000**	-0.000	-0.000**
	(0.267)	(0.001)	(0.305)	(0.001)	(0.305)	(0.001)

LnTrade	0.450***	1.855***	0.443***	1.853***	0.443***	1.853***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	13.796	-1.350	0.056**	0.445***	-0.044	0.049
	(0.079)	(0.893)	(0.009)	(0.000)	(0.312)	(0.727)
Developing	0.311*	0.381	0.284*	0.379	0.283*	0.378
	(0.010)	(0.136)	(0.018)	(0.138)	(0.019)	(0.139)
LnLagFDI	0.695***		0.670***		0.670***	
	(0.000)		(0.000)		(0.000)	
Constant	-3.811***	-18.411***	-3.682***	-18.518***	-3.677***	-18.519***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Obs.	1703	1810	1703	1810	1703	1810
R^2	0.635	0.178	0.633	0.177	0.633	0.177

Note: *p > 0.05, **p > 0.01, ***p > 0.001.

Just like with the different variations of model 1 it is useful to look at the explanatory power of the different versions of model 2a before delving into the statistical significance of specific variables. The first thing that stands out is that, with roughly 63%, the models in which the lagged version of the dependent variable is included as a control variable have a much higher explanatory power than the models in which the *lnLagFDI* variable is excluded for reasons of multicollinearity (an R^2 of approximately 18%). This does not mean that model 1a_I, 1a_III, and 1a_V are necessarily better than the other models. For starters, when the lagged version of FDI is not included, the coefficient of the constant (β_0) is much higher in absolute terms. The reason for this is that the model has difficulty telling *lnFDI* and *lnLagFDI* apart.

When considering the statistical significance of the different variables, it becomes clear that none of the mega sports events under consideration have a statistically significant effect on foreign direct investment, at least not during the games-phase (t-1 until t+1). Rather, a country's relative success in attracting foreign direct investment seems to be determined by its openness to trade. The proxy for openness, *lnTrade*, appears to have a positive impact on FDI and is statistically significant at the 99.9 percent confidence level across the board. The different variations of model 1a also indicate that the nation's economic situation in the period when the sports tournament is hosted is important for GDP per capita growth. In fact – depending on the model – the natural logarithm of GDP, the natural logarithm of GDP per capita, and inflation (which acts as a proxy for the country's economic stability) are all statistically significant. Whether the country was classified as a high-income country or a developing country, the country's size, and foreign direct investment with a one

year lag have also been found to be statistically significant in different variations of the model. Frankly, the only variables that do not appear to have any effect on the growth rate of GDP per capita – during the games-phase – seem to be the dummy variables for the different sports events.

Table 5: ***Pre-games phase, model 2 – General Least Squares regression***

LnFDI	**M 2b_I**	**M 2b_II**	**M 2b_III**	**M 2b_IV**	**M 2b_V**	**M 2b_VI**
DsportEvent	0.209	0.229	0.161	0.231	0.161	0.230
	(0.210)	(0.714)	(0.358)	(0.712)	(0.360)	(0.713)
Summer O.	-0.081	-0.539	-0.029	-0.540	-0.029	-0.539
	(0.619)	(0.272)	(0.866)	(0.271)	(0.868)	(0.271)
Winter O.	-0.346*	-0.230	-0.294	-0.301	-0.294	-0.300
	(0.029)	(0.662)	(0.085)	(0.661)	(0.086)	(0.662)
FIFA W.C.	-0.132	0.111	-0.129	0.109	-0.129	0.109
	(0.541)	(0.853)	(0.555)	(0.856)	(0.555)	(0.856)
UEFA Euro	-0.345	-0.323	-0296	-0.324	-0.295	-0.324
	(0.093)	(0.640)	(0.160)	(0.637)	(0.161)	(0.638)
Africa Cup	-0.369	-0.693	-0.337	-0.695	-0.337	-0.695
	(0.084)	(0.298)	(0.115)	(0.296)	(0.116)	(0.296)
Copa A.	-0.052	-0.116	0.003	-0.119	0.003	-0.118
	(0.768)	(0.851)	(0.987)	(0.847)	(0.985)	(0.848)
LnGDP	-13.619	-0.691			0.097**	0.401***
	(0.077)	(0.954)			(0.010)	(0.000)
LnGDPpc	13.722	1.088	0.098**	0.401***		
	(0.075)	(0.927)	(0.010)	(0.000)		
Inflation	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***
	(0.255)	(0.001)	(0.289)	(0.001)	(0.289)	(0.001)
LnTrade	0.466***	1.848***	0.459***	1.847***	0.458***	1.847***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	13.678	1.127	0.057**	0.440***	-0.040	0.039
	(0.076)	(0.925)	(0.007)	(0.000)	(0.369)	(0.774)
Developing	0.302*	0.397	0.276*	0.394	0.275*	0.394
	(0.012)	(0.120)	(0.021)	(0.124)	(0.021)	(0.124)
LnLagFDI	0.693***		0.687***		0.697***	
	(0.000)		(0.000)		(0.000)	

Constant	-3.853*** (0.000)	-18.322*** (0.000)	-3.728*** (0.000)	-18.418*** (0.000)	-3.724*** (0.000)	-18.418*** (0.000)
Obs.	1703	1810	1703	1810	1703	1810
R^2	0.636	0.181	0.634	0.179	0.634	0.179

Note: *p > 0.05, **p > 0.01, ***p > 0.001.

Table 5 shows the estimates obtained by performing a General Least Squares (GLS) panel regression on the different variations of model 2b. During the pre-games phase, hosting mega sports events does not appear to have a statistically significant effect on foreign direct investment. The only mega sports event that has been found to be statistically significant (with a probability value of 0.029) is the Winter Olympics in model 2b_I. Since the coefficient is negative, the model implies that hosting the Winter Olympics has a significantly negative effect on attracting foreign direct investment in the period leading up to the event. However, since model 2b_I is the variation which includes all variables for which multicollinearity is likely to be an issue, the estimates obtained in this version of model 2b cannot be taken at face-value. In every other variation within model 2b, the statistical significance attached to the period leading up to hosting the Winter Olympics disappears.

As already touched upon, compelling evidence of multicollinearity can be observed in this model. Much like in model 2a, when both the natural logarithm of GDP and GDP per capita are included, the model cannot distinguish between them and they cancel each other out. Yet, when only one of these variables is included, it becomes statistically significant. Interestingly, the dummy variable which indicates whether a country is developing or not is only statistically significant (at the 95% confidence level) when *lnFDI* – with a one year lag – is included as a control variable in the estimation equation.

Table 6: ***Post-games phase, model 2 – General Least Squares regression***

LnFDI	**M 2c_I**	**M 2c_II**	**M 2c_III**	**M 2c_IV**	**M 2c_V**	**M 2c_VI**
DsportEvent	-0.444** (0.006)	-0.228 (0.257)	-0.443** (0.006)	-0.234 (0.245)	-0.442** (0.006)	-0.233 (0.246)
Summer O.	0.704*** (0.000)	0.513*** (0.000)	0.708*** (0.000)	0.517*** (0.000)	0.708*** (0.000)	0.516*** (0.000)
Winter O.	0.488** (0.007)	0.462 (0.107)	0.484** (0.006)	0.471 (0.101)	0.484** (0.006)	0.471 (0.102)
FIFA W.C.	0.443** (0.003)	0.520** (0.001)	0.440** (0.003)	0.520** (0.001)	0.440** (0.003)	0.520** (0.001)

UEFA Euro	0.553*	0.490	0.623**	0.465	0.623**	0.467
	(0.010)	(0.077)	(0.001)	(0.085)	(0.001)	(0.084)
Africa Cup	0.461*	0.435	0.445*	0.436	0.445*	0.436
	(0.017)	(0.097)	(0.023)	(0.098)	(0.023)	(0.098)
Copa A.	0.774***	0.727*	0.782***	0.731*	0.782***	0.731*
	(0.000)	(0.025)	(0.000)	(0.024)	(0.000)	(0.025)
LnGDP	-12.812	6.249			0.095*	0.382***
	(0.111)	(0.575)			(0.015)	(0.000)
LnGDPpc	12.914	-5.871	0.095*	0.382***		
	(0.108)	(0.598)	(0.014)	(0.000)		
Inflation	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***
	(0.188)	(0.000)	(0.209)	(0.000)	(0.209)	(0.000)
LnTrade	0.461***	1.853***	0.452***	1.852***	0.452***	1.852***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	12.870	-5.818	0.055**	0.436***	-0.040	0.054
	(0.109)	(0.602)	(0.008)	(0.000)	(0.379)	(0.697)
Developing	0.302*	0.361	0.278*	0.359	0.277*	0.360
	(0.014)	(0.172)	(0.023)	(0.174)	(0.023)	(0.174)
LnLagFDI	0.692***		0.697***		0.697***	
	(0.000)		(0.000)		(0.000)	
Constant	-3.809***	-18.116***	-3.672***	-18.233***	-3.668***	-18.235***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	1703	1810	1703	1810	1703	1810
R^2	0.636	0.183	0.635	0.183	0.635	0.183

Note: *p > 0.05; **p > 0.01;***p > 0.001.

Table 6 shows the results obtained by estimating the different variations of model 2c, which estimates the effect on FDI in the post-games phase (i.e. t+2 until t+4). The estimates indicate that different mega sports events may have a significant positive effect on attracting foreign direct investment. Having hosted the FIFA World Cup, the Summer Olympics, or the Copa America has a statistically significant positive effect on FDI in every variation of model 2c. Furthermore, there is some evidence that having hosted the Winter Olympics, the UEFA European Cup, and the African Cup of Nations may have a positive effect on FDI. This result is consistently obtained in models

which also control for *lnLagFDI* (Models 2c_I, 2c_III, and 2c_V). Paradoxically, the results presented in table 6 suggests that hosting mega sports events has a negative effect on foreign direct investment. Yet, simultaneously, the post-games effect of individual mega sports events is found to be positive. In terms of control variables, roughly the same picture emerges as in table 4 and table 5.

Table 7: ***Full period, model 2 – General Least Squares regression***

LnFDI	**M 2d_I**	**M 2d_II**	**M 2d_III**	**M 2d_IV**	**M 2d_V**	**M 2d_VI**
DsportEvent	-0.108	-0.401	-0.092	-0.395	-0.092	-0.395
	(0.189)	(0.127)	(0.299)	(0.129)	(0.299)	(0.129)
Summer O.	0.286**	0.294	0.282**	0.288	0.282**	0.289
	(0.001)	(0.110)	(0.003)	(0.115)	(0.003)	(0.114)
Winter O.	0.081	0.537*	0.067	0.534*	0.067	0.534*
	(0.443)	(0.014)	(0.537)	(0.015)	(0.536)	(0.015)
FIFA W.C.	0.094	0.759**	0.073	0.752**	0.073	0.753**
	(0.219)	(0.007)	(0.398)	(0.007)	(0.398)	(0.007)
UEFA Euro	0.117	0.483	0.129	0.471	0.129	0.473
	(0.369)	(0.208)	(0.312)	(0.208)	(0.311)	(0.207)
Africa Cup	0.076	0.241	0.045	0.232	0.045	0.232
	(0.515)	(0.473)	(0.734)	(0.483)	(0.736)	(0.482)
Copa A.	0.332**	0.788*	0.324**	0.781*	0.325**	0.782*
	(0.007)	(0.019)	(0.009)	(0.020)	(0.009)	(0.020)
LnGDP	-12.806	3.926			0.087*	0.390***
	(0.085)	(0.697)			(0.031)	(0.000)
LnGDPpc	12.900	-3.538	0.088*	0.390***		
	(0.083)	(0.725)	(0.031)	(0.000)		
Inflation	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***
	(0.196)	(0.001)	(0.214)	(0.001)	(0.214)	(0.001)
LnTrade	0.483***	1.867***	0.475***	1.868***	0.475***	1.868***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	12.863	-3.498	0.055**	0.430***	-0.032	0.395
	(0.083)	(0.729)	(0.008)	(0.000)	(0.496)	(0.770)
Developing	0.286*	0.395	0.263*	0.395	0.262*	0.396
	(0.023)	(0.117)	(0.035)	(0.117)	(0.035)	(0.117)
LnLagFDI	0.689***		0.693***		0.693***	

	(0.000)		(0.000)		(0.000)	
Constant	-3.828*** (0.000)	-18.255*** (0.000)	-3.689*** (0.000)	-18.297*** (0.000)	-3.685*** (0.000)	-18.298*** (0.000)
Obs.	1703	1810	1703	1810	1703	1810
R^2	0.637	0.181	0.635	0.182	0.635	0.182

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

Finally, model 2d estimates the effect hosting a mega sports event has on foreign direct investment over a nine-year period. The estimates provide some evidence that, depending on the variation of the model, there may be an economic benefit – in terms of attracting foreign direct investment – which accrues from hosting the Summer Olympics (model 2d_I, 2d_III, and 2d_V; statistically significant at the 99% confidence level), the Winter Olympics (model 2d_II, 2d_IV, and 2d_VI; statistically significant at the 95% confidence level), and the FIFA World Cup (model 2d_II, 2d_IV, and 2d_VI; statistically significant at the 99% confidence level). Over the same period, hosting the Copa America consistently appears to have a positive effect on FDI.

When we turn our attention to the control variables, and the explanatory powers of the models, the results obtained by estimating the sub-models of multiple regression equation 2d show approximately the same trends as the other variations of model 2. The only variable that is consistently found to have a positive and (highly) statistically significant effect on FDI is *lnTrade*. Depending on which variation of the model is estimated, *lnGDP*, *lnGDPpc*, *Inflation*, *lnPop*, *lnLagFDI*, and the dummy *Developing* have also been found to be statistically significant at times.

Table 8: ***Model 3_I (Games-phase, a; Pre-games phase, b; Post-games phase, c; Full period, d)***

GDPpcG	**Model 3a_I**	**Model 3b_I**	**Model 3c_I**	**Model 3d_I**
DevSE	-0.001 (0.984)	0.005 (0.944)	0.002 (0.966)	0.008 (0.878)
AdvSE	-0.106 (0.246)	-0.054 (0.435)	-0.089 (0.201)	-0.076 (0.279)
PopGrowth	-0.0.46** (0.006)	-0.046** (0.006)	-0.047** (0.005)	-0.050** (0.004)
Constant	0.291*** (0.000)	0.286*** (0.000)	0.290*** (0.000)	0.300*** (0.000)
Observations	2115	2115	2115	2115
R^2	0.000	0.000	0.000	0.000

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

Table 8 shows the results obtained by estimating the different versions of model 3_I, which is used to test hypothesis 3a. The first thing that stands out from model 3_I is the extremely low

explanatory power of the model, which is less than 1%. The only variable that bears any statistical significance in model 3_I is the control variable *PopGrowth*. The results suggest that, regardless of whether a sports mega-event is hosted in a developed or developing country, it does not have any statistically significant effect on GDP per capita growth.

Table 9: Model 3_II – Hosting sports mega-events: developing versus advanced countries

GDP per capita growth	**Model 3_II: Developing**	**Model 3_II: Advanced**
Sports Event – Games	0.001 (0.990)	-0.116 (0.220)
Sports Event – Pre-games	0.006 (0.932)	-0.069 (0.359)
Sports Event – Post-games	0.004 (0.948)	-0.103 (0.187)
Population Growth	-0.045** (0.007)	-0.047** (0.006)
Constant	0.282*** (0.000)	0.301*** (0.000)
Observations	2115	2115
R^2	0.000	0.001

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

In table 9, which shows the estimates obtained from model 3_II, a similar picture emerges as in table 8. Frankly, for both developing countries and advanced economies the model shows no relationship between hosting a mega sports event and economic performance. Again, only the variable which controls for population growth appears to have a statistically significant effect on GDP per capita growth.

Table 10: ***Model 4a (Games-phase) and 4b (Pre-games phase) – GLS regression***

LnFDI	**M 4a_I**	**M 4a_II**	**M 4a_III**	**M 4b_I**	**M 4b_II**	**M 4b_III**
DevSEgame	0.078	0.066	0.166			
	(0.329)	(0.390)	(0.318)			
AdvSEgame	0.012	0.016	0.098			
	(0.884)	(0.840)	(0.478)			
DevSEpre				-0.005	-0.019	-0.241
				(0.950)	(0.810)	(0.105)
AdvSEpre				-0.060	-0.055	-0.026
				(0.325)	(0.360)	(0.872)
LnGDP	-11.205			-10.993		
	(0.063)			(0.055)		

LnGDPpc	11.220	0.017	0.316***	11.009	0.018	0.317***
	(0.063)	(0.442)	(0.000)	(0.055)	(0.411)	(0.000)
Inflation	-0.000	-0.000	-0.000**	-0.000	-0.000	-0.000***
	(0.395)	(0.433)	(0.001)	(0.389)	(0.424)	(0.001)
LnTrade	0.426***	0.421***	1.848***	0.424***	0.420***	1.845***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	11.267	0.060**	0.496***	11.057	0.062**	0.502***
	(0.062)	(0.009)	(0.000)	(0.054)	(0.007)	(0.000)
LnLagFDI	0.706***	0.709***		0.707***	0.710***	
	(0.000)	(0.000)		(0.000)	(0.000)	
Constant	-2.801***	-2.763***	-18.410***	-2.819***	-2.781***	-18.473***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	1703	1703	1810	1703	1703	1810
R^2	0.631	0.630	0.157	0.631	0.630	0.154

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

Table 10 shows the estimates obtained by estimating model 4a (the games-phase) and 4b (the pre-games phase). Since the variations of both models control for the same variables, the explanatory power of model 4a_I is about the same as the explanatory power of model 4b_I. The same can be said for 4a_II and 4b_II, and 4a_III and 4b_III. First, the results obtained from estimating the three variations of model 4a will briefly be discussed. Then, the same will be done for model 4b.

Model 4a shows that, during the games-phase, hosting a mega sports event has no statistically significant effect on the amount of foreign direct investment a country attracts, irrespective of whether the country is developed or developing. Like in model 2, the country's openness has been found to be more important (the p-value of *lnTrade* is 0.000 in all variations). As is the size of the country's population (model 4a_II and 4a_III), foreign direct investment in the previous period (model 4a_I and 4a_II), GDP per capita (model 4a_III), and inflation (model 4a_III).

The results obtained from model 4b are largely similar. Here too, the estimates indicate that there is no statistically significant effect on foreign direct investment in the period before a sports mega-event is hosted by either a developed or developing country. Furthermore, for the control variables the same picture emerges as in model 4a.

Table 11: ***Model 4c (Post-games phase) and 4d (Full period) – General Least Squares regression***

LnFDI	**M 4c_I**	**M 4c_II**	**M 4c_III**	**M 4d_I**	**M 4d_II**	**M 4d_III**
DevSEpost	0.136*	0.146*	0.335**			
	(0.045)	(0.028)	(0.002)			
AdvSEpost	0.085	0.089	0.224			
	(0.244)	(0.220)	(0.064)			
DevSEtot				0.078	0.077	0.080
				(0.093)	(0.110)	(0.589)
AdvSEtot				0.027	0.033	0.138
				(0.624)	(0.544)	(0.287)
LnGDP	-10.295			-10.928		
	(0.113)			(0.083)		
LnGDPpc	10.310	0.016	0.306***	10.945	0.018	0.302***
	(0.113)	(0.441)	(0.000)	(0.083)	(0.417)	(0.000)
Inflation	-0.000	-0.000	-0.000***	-0.000	-0.000	-0.000**
	(0.358)	(0.388)	(0.001)	(0.384)	(0.422)	(0.001)
LnTrade	0.430***	0.426***	1.862***	0.429***	0.425***	1.855***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPop	10.357	0.060**	0.485***	10.989	0.059*	0.493***
	(0.111)	(0.009)	(0.000)	(0.082)	(0.011)	(0.000)
LnLagFDI	0.705***	0.708***		0.706***	0.709***	
	(0.000)	(0.000)		(0.000)	(0.000)	
Constant	-2.803***	-2.774***	-18.207***	-2.821***	-2.778***	-18.284***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	1703	1703	1810	1703	1703	1810
R^2	0.632	0.631	0.163	0.632	0.631	0.157

Note: *p > 0.05; **p > 0.01; ***p > 0.001.

Much like for table 10, the two period-variations presented in table 11 will be discussed in turn. Model 4c estimates the effect of having hosted a sports mega-event on FDI, whereas model 4d does the same but then for the whole period which is covered by the pre-games phase, the games-phase and the post-games phase.

The estimates obtained from model 4c indicate that, in the period after the sports mega-event has been hosted by a developing country, these countries attract significantly more foreign direct

investment than they otherwise would have. The dummy variable *DevSEpost* is statistically significant at the 95% confidence level in model 4c_I and 4c_II, and at the 90% confidence level in model 4c_III. The same effect cannot be observed for advanced economies, since the coefficients of *AdvSEpost* – although positive – are statistically insignificant. It almost goes without saying that, depending on which version of model 4c is estimated, all control variables – with the exception of *lnGDP*, which is most likely due to multicollinearity – are found to have a statistically significant effect on FDI.

The results obtained by estimating model 4d paint a different picture. Over the whole period, both *DevSEtot* and *AdvSEtot* are statistically insignificant at any of the conventional confidence levels. The estimates obtained for the control variables appear to have roughly the same statistical significances as have been observed in model 4a, 4b and 4c.

V. Discussion

The results obtained in the analysis in the previous section require careful scrutiny. There are a number of possible reasons why these mixed results could have been obtained, and these will largely be explained in the remainder of this section. Before going into any detail regarding the results and limitations of the analysis, the very limited explanatory power of model 1 and model 3 merits discussion.

As already touched upon in the previous section, the limited explanatory power of model 1 and model 3 implies that very little of the variation within the dependent variable – in this case GDP per capita growth – is explained by the independent variables. Hence, the model does not fit the data particularly well. The most logical explanation for this is that the weak explanatory power is largely caused by omitting endogenous variables. It stands to reason that, for instance, GDP per capita, FDI, and openness do impact GDP per capita growth. Therefore, issues related to endogeneity aside, had these variables been included in model 1 and model 3 this would have increased the model's explanatory power. Of course, this was not an option since an endogenous relationship exists between these variables and GDP per capita growth – which would have resulted in biased estimates.

What is interesting about the explanatory power of the different variations of model 1 is that Tien et al (2011) estimated roughly the same multiple regression equations as model 1_DSO and model 1_DWO – with the same two control variables as was done in this paper – and found a much higher R-squared (roughly 23% as opposed to approximately 1%). The difference in explanatory power can be explained by the fact that Tien et al (2011) only took the nine years – i.e. the full

period – into account in their model. In other words, they only incorporated the four years prior to, and the four years after, the year the sports mega-event was hosted in any given country into their panel regression. Consequently, there was far less variation in GDP per capita growth that had to be explained by the model. Of course, this approach also reduced the total number of observations that Tien et al (2011) were able to estimate.

Another take away from model 1 and model 3 is that the relationship beteen GDP per capita growth and population growth is consistently found to be negative and statistically highly significant (usually at the 99.9% confidence level). This result should not be surprising because this link is mathematically straightforward. Frankly, more population growth would mean more people and therefore more GDP growth would be required in order to compensate for the increasing population. Hence, ceteris paribus, a negative causal relationship between population growth and GDP per capita growth should always exist. In simple terms: if the population grows than – almost by definition (and with all else being held equal) – GDP per capita decreases. Thus, the statistical significance found for this variable in model 1 and model 3 was to be expected, and – naturally – indicates nothing regarding the effect hosting sports mega-events has on economic growth.

The variable which measures the country's openness – *lnTrade* – was highly significant in all variations of model 2 and model 4, which investigate the relationship between hosting mega sports events and the inflow of foreign direct investment. In a way, this result was to be expected. As briefly touched upon in the literature review, countries which are more open to international trade usually receive more foreign direct investment as well (Asiedu, 2002).

A more general remark concerning the econometric models used in this paper, once again particularly model 1 and model 3, is that none of the estimation equations control for the effect of tourism. As has been discussed in the literature review, proponents of hosting sports mega-events often point towards tourism as a factor which provides economic benefits (Lyu & Han, 2017; Pop et al, 2016; Whitson & Horne, 2006). Yet, as has been shown, different scholars hold different opinions regarding the economically beneficial effect of tourism. Either way, tourism may – and perhaps should – have been added as a control variable. There are two reasons this did not happen. First of all, the number of tourists that arrives due to a sports mega-event does not say anything about the actual expenditure by these tourists, nor what the tourists spend the money on. Second of all, it is difficult to distinguish between tourists that would have visited a country regardless of whether a sports mega-event is – or was – hosted there, and the "additional" tourists that visited the country specifically for the event. Furthermore, by not including tourism as a seperate variable any possible effect it has is – to some extent – captured by the dummy variables which indicate whether a sports mega-event will be, is, or has been hosted.

Provided a method can be found to address the two reasons that tourism has not been controlled for – i.e. the number of tourists does not say anything about their expenditure, and that it is difficult to link tourism arrivals to a specific sports mega-event – in the analysis in this paper, the effect of tourism on the economic benefits that may – or may not – accrue from hosting sports mega-events may be an interesting topic for further research.

Now that some (general) limitations have been discussed it is time to link the results obtained in the previous section to their respective hypotheses. Due to the large number of estimation equations that have been estimated, a comprehensive overview of which models are applicable to which hypotheses can be found in appendix F to accommodate the reader. The models will now be discussed in chronological order, starting with model 1.

The different variations of model 1, which estimates the effect of hosting mega sports events on economic growth, are used to test hypothesis 1a through 1d. Based on the results obtained from model 1, hypothesis 1a; "*Sports mega-events have a positive impact on economic growth, but only in the period leading up to the mega-event."* is rejected. The estimates obtained by estimating model 1c do indicate that there may be a small effect on GDP per capita during the post-games phase – at least for certain sports mega-events – but none of the models indicate an effect in the pre-games phase. This result is puzzling because it contradicts the finding by Tien et al (2011), who found some weak evidence of a positive effect on economic performance during the pre-games phase.

Hypothesis 1b, *"Hosting nation-wide football tournaments has a larger impact on economic growth than hosting the Olympic Games"*, should also be rejected. Even though a positive impact on economic growth has been found for the FIFA World Cup and the UEFA European Cup in the post-games phase (model 1c), hosting the Summer Olympics also appears to have a statistically significant positive effect during this phase. No relationship has been found between economic performance on the one hand, and the Winter Olympics, the African Cup of Nations, and the Copa America in any of the models which estimate particular phases of the game. It is entirely possible that the African Cup of Nations and the Copa America may simply be too small to have any significant effect on economic performance. Often less countries participate than during the UEFA European Cup and the FIFA World Cup. Besides, the African Cup of Nations has often been hosted in January – February, while the major football competitions – like the English Premier League – are still in session. As a result, the African Cup of Nations may not receive as much (international) media coverage as sports mega-events of comparable set-up and size. This may impede the tournament's ability to attract fans, and therefore there will be less (additional) spending by tourists throughout the duration of the tournament. Another possible explanation as to why no significant

effect has been found for the Copa America and the African Cup of Nations is that these tournaments are often hosted by developing countries, whereas the other major football tournaments have often been hosted by developed nations (see appendix A). Due to the host country, and the majority of participating countries, being in the developing stage it might be the case that the fans that can afford to attend the games have less disposable income than fans from developed countries. Of course, less disposable income means less additional spending, which means less additional expenditure (by tourists) flowing into the local economy. This, in turn, translates into a smaller multiplier effect. In this case, the virtuous cycle that is the multiplier – as described by Baade and Matheson (2004) – is much less potent in providing the host country with economic benefits.

As opposed to hypothesis 1a and 1b, some evidence which supports hypothesis 1c, *"Hosting the Summer Olympics has a larger impact on economic growth than hosting the Winter Olympics"*, has been found. Model 1c and model 1_DSO clearly indicate that hosting the Summer Olympics has a statistically significant positive effect on GDP per capita growth during the post-games phase. Simultaneously, model 1c also indicates that there is no relationship between GDP per capita growth and hosting the Winter Olympics. Model 1_DWO does not find an effect of hosting the Winter Olympics either. Therefore, hypothesis 1c cannot be rejected.

Hypothesis 1d, *"Hosting a sports mega-event has no long-term positive effect on economic growth"*, cannot be rejected. Frankly, there are two reasons why hypothesis 1d – despite some mixed results – cannot be rejected. The first reason is that in the post-games phase (model 1c) a statistically significant positive effect has been found for the Summer Olympics, the FIFA World Cup, and the UEFA European Cup although no effect has been found for the other sports mega-events. Simultaneously, a negative effect has been found for the dummy variable *Mega Sport Event* for that same period (model 1c), even though its coefficient (-0.262) is smaller – in absolute value – than, for example, the coefficient obtained for the Summer Olympics (+0.304). Yet it is larger – again, in absolute value – than the coefficient obtained for the impact of hosting the FIFA World Cup (+0.183). Second of all, even though these effects have been found for the post-games phase, it it uncertain whether the effect will linger, say, five years (or ten years, for that matter) after the games have been hosted. Thus, despite some mixed results hypothesis 1d should not be rejected.

The different variations of model 2, which estimate the effect of hosting mega sports events on the host country's ability to attract foreign direct investment, are used to test hypothesis 2a, 2b and 2c. Based on the results obtained by estimating model 2a through 2d, hypothesis 2a; *"Hosting nation-wide football tournaments has a positive impact on foreign direct investment, but only in the period leading up to the event"*, should be rejected. A statistically significant relationship between FDI inflows and hosting mega sports events has been found in the post-games phase (model 2c).

This effect is often positive and has been found for every sports mega-event under investigation (see table 6). Hosting the Summer Olympics, the Winter Olympics, the FIFA World Cup and the Copa America have also – at times, depending on the control variables – been found to have a significant impact on FDI over the full period (model 2d). Hence, while hypothesis 2a should be rejected, hypothesis 2b "*Hosting the Olympic Games has no effect on foreign direct investment*" should not be rejected. These findings fly directly in the face of the findings reported by Jakobsen et al (2013) who found no relationship between hosting the Olympics and the inflow of FDI, and only found a weak positive relationship between FDI and both the FIFA World Cup and the UEFA European Cup during the pre-games phase. The findings in this paper indicate that a (positive) statistically significant relationship between sports mega-events and FDI inflow may exist, and that the effect manifests itself in the post-games phase instead of the pre-games phase. Since this is quite the puzzling result, which flies directly in the face of the result obtained by Jakobsen et al (2013), more research regarding the effect of hosting sports mega-events on FDI is undoubtedly required.

Unlike hypothesis 1d, hypothesis 2c, *"Hosting a sports mega-event has no long-term impact on foreign direct investment"*, has to be rejected although it cannot be dismissed lightly. Here too, mixed results were obtained. Model 2c (the post-games phase) consistently found a positive effect from hosting particular sports mega-events on foreign direct investment. A negative effect was found for the dummy variable *Sports Mega Event*, but the coefficient was lower (in absolute numbers) than those of each specific mega sports event. Of course, it remains uncertain whether the positive impact on FDI will continue after the post-games phase has ended although there is no compelling reason – perhaps except for "memory fades" – that this should be the case. Especially if one considers that different variations of model 2 consistently show that the inflow of FDI in the previous year is a strong predictor of the inflow of FDI in the current year (although admittedly these estimates may suffer from bias caused by multicollinearity).

Finally, before diving into hypothesis 3a – *"Hosting a sports mega-event has a larger effect on economic growth in developing countries than developed countries"* – and 3b – *"Hosting a sports mega-events has no effect on foreign direct investment in either developing or developed countries"* – it should be noted that these results may be slightly biased, because developing and developed countries organize different sports mega-events. For example, no developed country has ever hosted the African Cup of Nations. Conversely, very few developing countries have historically organized the FIFA World Cup or the Olympic Games. As has been touched upon earlier in this section, it may be the case that the African Cup of Nations and the Copa America are simply not large enough to have a (statistically) significant effect on the economy of the host country, particularly on GDP per capita growth.

Having said that, hypothesis 3a – which has been tested by estimating the different variations of model 3 – has to be rejected. Based on the estimates obtained by running model 3_I and model 3_II, there is no evidence that sports mega-events impact economic growth any differently in developed as opposed to developing countries. This result indicates that it is unlikely that developing nations can "play their way to prosperity", as investigated by Matheson and Baade (2004). However, it should be stressed that this is by no means a definitive result because of the weak explanatory power of the model and the fact that developed and developing countries tend to host different sports mega-events of different magnitudes.

Hypothesis 3b is also rejected, but for an entirely different reason. Based on Matheson and Baade (2004), Rose and Spiegel (2011) and Jakobsen et al (2013) the prediction was that there is no difference in the impact of hosting sports mega-events on FDI in either developing or developed countries. However, the results obtained by estimating different variations of model 4 (particularly model 4c) show that developing countries that organize sports mega-events may attract more FDI than advanced countries. In line with the results obtained by estimating model 2, this effect is found during the post-games phase.

Ultimately, it is difficult to base any recommendations for public policy on the findings that have just been discussed. Based on the results obtained using model 1c, there is some indication that hosting a sports mega event – particularly the Summer Olympics and perhaps the FIFA World Cup – may have a positive impact on economic growth in the post-games phase. Furthermore, during this same phase the results obtained for model 2c indicate that there may also be positive relationship between hosting a sports mega-event and the host country's ability to attract FDI. Hence, it might be the case that the benefits that accrue during the post-games phase merit hosting such an event. However, since it is unclear whether these benefits outweigh the costs of hosting mega sports events or how large these benefits actually are, more research is necessary before any substantive recommendations can be given regarding policy.

Of course, it should be noted that there are also non-economic benefits – which are largely outside the scope of this paper – that should be considered by policy-makers when deciding whether or not to host a mega sports event. As one might recall, one of these benefits is provided by De Nooij and Van den Berg (2017), who suggest that hosting a sports mega-event could make the host's citizens proud and happy – and can therefore potentially improve well-being.

VI. Conclusion

In this paper, three distinct research questions have been investigated, regarding which

conclusions will now be drawn in turn. To recap, these research questions were:

1. *Does hosting sports mega-events boost economic growth, and do different mega sports events impact economic growth differently?*

2. Do sports mega-events attract foreign direct investment, and is there a difference between sports mega-events in the capacity to attract FDI?

3. Do sports mega-events have a different impact, in terms of economic growth and foreign direct investment, on developing countries than on developed countries?

The different variations of model 1, which are used to test the hypotheses which correspond to the first research question, can be used to answer the first research question. In doing so, some evidence has been found supporting the idea that hosting sports mega-event does have an impact on economic growth, particularly in the post-games phase. Furthermore, different sports mega-events may have a different impact on GDP per capita. In particular, whereas hosting the Summer Olympics, the FIFA World Cup and the UEFA European Cup may have a positive effect, hosting the Winter Olympics, the African Cup of Nations and the Copa America does not appear to have any effect on economic growth. However, in the long-term there does not appear to be an effect on economic growth.

The answer to the second research question is different than the answer to the first research question. Sports mega-events do appear to attract foreign direct investment (particularly in the post-games phase), although there appears to be little difference regarding specific sports mega-events. In fact, depending on the control variables, different variations of model 2 have shown that hosting any sports mega-event can have a positive impact on the inflow of foreign direct investment. This effect may even persist in the long-term, although more research is required to verify this.

Finally, the answer to the last research question – investigated using model 3 and model 4 – is that there is no compelling evidence that hosting mega sports-events has a different impact on economic growth in countries in different stages of development (model 3). Yet, some evidence has indeed been found, using a variation of model 4, supporting the idea that developing and developed countries may differ in their capacity to attract FDI in the post-games phase. On the whole, the evidence regarding a significant difference between developing and developed nations is not particularly strong, however. As explained in the previous section, this may in part be due to the inherently different sports mega-events that are hosted by developed and developing countries.

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VIII. Appendix

Appendix A. ***List of sport mega-events***

Type of event	**Year**	**Host country**	**Continent**
FIFA World Cup	1970	Mexico	Latin America
African Cup of Nations	1970	Sudan**	Africa
UEFA European Cup	1972	Belgium	Europe
Summer Olympics	1972	Germany	Europe
Winter Olympics	1972	Japan	Asia
African Cup of Nations	1972	Cameroon	Africa
FIFA World Cup	1974	Germany	Europe
African Cup of Nations	1974	Egypt	Africa
UEFA European Cup	1976	Yugoslavia*	Europe
Summer Olympics	1976	Canada	North America
Winter Olympics	1976	Austria	Europe
African Cup of Nations	1976	Ethiopia**	Africa
FIFA World Cup	1978	Argentina	Latin America
African Cup of Nations	1978	Ghana	Africa
UEFA European Cup	1980	Italy	Europe
Summer Olympics	1980	Russia	Europe
Winter Olympics	1980	United States	North America
African Cup of Nations	1980	Nigeria	Africa
FIFA World Cup	1982	Spain	Europe
African Cup of Nations	1982	Libya**	Africa
UEFA European Cup	1984	France	Europe
Summer Olympics	1984	United States	North America
Winter Olympics	1984	Yugoslavia*	Europe
African Cup of Nations	1984	Ivory Coast	Africa
FIFA World Cup	1986	Mexico	Latin America
African Cup of Nations	1986	Egypt	Africa
Copa America	1987	Argentina	Latin America

UEFA European Cup	1988	Germany	Europe
Summer Olympics	1988	South Korea	Asia
Winter Olympics	1988	Canada	North America
African Cup of Nations	1988	Morocco	Africa
Copa America	1989	Brazil	Latin America
FIFA World Cup	1990	Italy	Europe
African Cup of Nations	1990	Algeria	Africa
Copa America	1991	Chile	Latin America
UEFA European Cup	1992	Sweden	Europe
Summer Olympics	1992	Spain	Europe
Winter Olympics	1992	France	Europe
African Cup of Nations	1992	Senegal	Africa
Copa America	1993	Ecuador	Latin America
FIFA World Cup	1994	United States	North America
Winter Olympics	1994	Norway	Europe
African Cup of Nations	1994	Tunisia	Africa
Copa America	1995	Uruguay	Latin America
UEFA European Cup	1996	United Kingdom	Europe
Summer Olympics	1996	United States	North America
African Cup of Nations	1996	South Africa	Africa
Copa America	1997	Bolivia	Latin America
FIFA World Cup	1998	France	Europe
Winter Olympics	1998	Japan	Asia
African Cup of Nations	1998	Burkina Faso	Africa
Copa America	1999	Paraguay	Latin America
UEFA European Cup	2000	Belgium and The Netherlands	Europe
Summer Olympics	2000	Australia	Australia
African Cup of Nations	2000	Ghana and Nigeria	Africa
Copa America	2001	Colombia	Latin America
FIFA World Cup	2002	South Korea and Japan	Asia
Winter Olympics	2002	United States	North America
African Cup of Nations	2002	Mali	Africa
UEFA European Cup	2004	Portugal	Europe
Summer Olympics	2004	Greece	Europe
African Cup of Nations	2004	Tunisia	Africa

Copa America	2004	Peru	Latin America
FIFA World Cup	2006	Germany	Europe
Winter Olympics	2006	Italy	Europe
African Cup of Nations	2006	Egypt	Africa
Copa America	2007	Venezuela	Latin America
UEFA European Cup	2008	Austria and Switzerland	Europe
Summer Olympics	2008	China	Asia
African Cup of Nations	2008	Ghana	Africa
FIFA World Cup	2010	South Africa	Africa
Winter Olympics	2010	Canada	North America
African Cup of Nations	2010	Angola	Africa
Copa America	2011	Argentina	Latin America
UEFA European Cup	2012	Poland and Ukraine	Europe
Summer Olympics	2012	United Kingdom	Europe
African Cup of Nations	2012	Gabon and Equatorial Guinea	Africa
African Cup of Nations	2013	South Africa	Africa
FIFA World Cup	2014	Brazil	Latin America
Winter Olympics	2014	Russia	Europe
African Cup of Nations	2015	Equatorial Guinea	Africa
Copa America	2015	Chile	Latin America
UEFA European Cup	2016	France	Europe
Summer Olympics	2016	Brazil	Latin America
Copa America	2016	United States	North America
African Cup of Nations	2017***	Gabon	Africa
FIFA World Cup	2018***	Russia	Europe
Winter Olympics	2018***	South Korea	Asia

Note 1: The UEFA European Cup in 1976 (*) and the Winter Olympics in 1984 (*) were held in Yugoslavia (Europe). Since this country does not exist anymore, these mega-sports events have been dropped from the sample.
Note 2: Due to limited data-availability Ethiopia, Libya, and Sudan (**) have been excluded from the sample.
Note 3: Since the dataset covers the period 1970 – 2016, the sports mega-events hosted in 2017 and 2018 (***) actually took place outside the scope of the sample. However, because the pre-games phase covers t-4 until t-2 the pre-games phase falls within the scope of the data. Therefore, the 2017 African Cup of Nations, and the 2018 Winter Olympics and FIFA World Cup are included here.

Appendix B. ***Descriptive statistics***

Variable	**N***	**Mean**	**SD***	**Minimum**	**Maximum**

GDP per capita growth	2156	2.031	5.682	-27.146	140.501
GDP	2163	791,000,000,000	1,830,000,000,000	165,000,000	16,900,000,000,000
GDP per capita	2163	16176.27	17986.9	228.32	91617.28
Foreign Direct Investment	2034	2.380	6.215	-8.589	161.824
Inflation	2067	42.574	377.566	-17.640	11749.64
Population	2256	62,100,000	168,000,000	244,485	1,380,000,000
Population growth	2256	1.440	1.135	-4.214	7.890
Trade	2145	60.107	39.160	4.921	531.737

Note 1: N represents the number of observations, SD is an abbreviation of Standard Deviation.
Note 2: The dummy variables 'mega-sport event' (DsportEvent), 'Summer Olympics' (DSOlympics), 'Winter Olympics' (DWOlympics), 'FIFA World Cup' (D_WC), 'UEFA European Cup' (D_UEFA), 'Africa Cup of Nations' (D_AfricaCup), 'Copa America' (D_CopaA), and 'developing country' (Developing) have been excluded because they take the value of either 0 or 1. There are 2256 observations for the dummies related to sports mega-events, and 2207 observations regarding whether a country is developed or developing.
Note 3: 'GDP per capita growth', 'Foreign Direct Investment', 'Population growth', 'Inflation' and 'Trade' are expressed in percentages. Whereas 'GDP' and 'GDP per capita' are expressed in monetary values. Finally, the variable 'Population' represents a number of persons.

Appendix C. ***Pairwise correlations – Multicollinearity***

	GDPpcG	LnGDP	LnGDPpc	LnFDI	LnLagFDI	LnPop	PopGrowth	Developing
GDPpcG	1							
LnGDP	-0.0165	1						
LnGDPpc	-0.0258	0.7521*	1					
LnFDI	0.1353	0.0054	0.0691	1				
LnLagFDI	0.1423	0.0040	0.0709	0.7884*	1			
LnPop	0.0025	0.7176*	0.0808	-0.0652	-0.0695	1		
PopGrowth	-0.0054	-0.6531	-0.6410	-0.0074	0.0003	-0.2569	1	
Developing	0.0325	-0.5991	-0.8304*	0.0125	0.0082	-0.0220	0.5198	1

Note 1: The pairwise correlations were first calculated using all variables included in the model (not shown), but due to the high number of variables the decision was made to run the pairwise correlations again with the variables that returned relatively high pairwise correlations for which multicollinearity could reasonably be suspected.
Note 2: For pairwise correlations with an asteriks (*) the pairwise correlation of >70% indicates that multicollinearity may be an issue.

Appendix D. ***Breusch-Pagan / Cook-Weisberg and White's test for Heteroskedasticity***

Model	**Test**	**Chi2 (df)**	**P-value**
Model 1a: Games-phase	Breusch-Pagan	1013.57 (1)	0.000*
	White	247.81 (97)	0.000*

Model 1b: Pre-games phase	Breusch-Pagan	1056.91 (1)	0.000*
	White	249.83 (94)	0.000*
Model 1c: Post-games phase	Breusch-Pagan	951.37 (1)	0.000*
	White	247.44 (94)	0.000*
Model 1d: Full period model	Breusch-Pagan	1154.03 (1)	0.000*
	White	258.53 (109)	0.000*
Model 2a: Games-phase	Breusch-Pagan	317.07 (1)	0.000*
	White	219.24 (82)	0.000*
Model 2b: Pre-games phase	Breusch-Pagan	319.36 (1)	0.000*
	White	247.13 (79)	0.000*
Model 2c: Post-games phase	Breusch-Pagan	321.70 (1)	0.000*
	White	201.97 (79)	0.000*
Model 2d: Full period model	Breusch-Pagan	316.44 (1)	0.000*
	White	217.16 (93)	0.000*

Note: For all models both the Breusch-Pagan / Cook-Weisberg test and the White test show compelling evidence for Heteroskedasticity. Even at the significance level of $p > 0.001$ the tests reject the hypotheses of constant variances (Breusch-Pagen / Cook-Weisberg) and homoskedasticity (White), respectively.

Appendix E. ***Different variations of model 2, due to multicollinearity.***

Model 2a_I – Games phase; with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2a_II – Games phase; without lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \varepsilon_{it}$$

Model 2a_III – Games phase; without lnGDP, with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \beta_{13} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2a_IV – Games phase; without lnGDP and lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it} + \beta_5 DUEFAgame_{it} + \beta_6 DACNgame_{it} + \beta_7 DCopaAgame_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \varepsilon_{it}$$

Model 2a_V – Games phase; without lnGDPpc, with lag FDI

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventgame_{it} + \beta_2 DSOgame_{it} + \beta_3 DWOgame_{it} + \beta_4 DWCgame_{it}$$

$$+\beta_5 DUEFAgame_{it}+\beta_6 DACNgame_{it}+\beta_7 DCopaAgame_{it}+\beta_8 lnGDP_{it}+\beta_9 Inflation_{it}$$
$$+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}+\beta_{12} DDeveloping_{it}+\beta_{13} lnFDI_{i,t-1}+\varepsilon_{it}$$

Model 2a_VI – Games phase; without lnGDPpc and lag FDI

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventgame_{it}+\beta_2 DSOgame_{it}+\beta_3 DWOgame_{it}+\beta_4 DWCgame_{it}$$
$$+\beta_5 DUEFAgame_{it}+\beta_6 DACNgame_{it}+\beta_7 DCopaAgame_{it}+\beta_8 lnGDP_{it}+\beta_9 Inflation_{it}$$
$$+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}+\beta_{12} DDeveloping_{it}+\varepsilon_{it}$$

Model 2b_I – Pre-games phase; with lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} Inflation_{it}+\beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} DDeveloping_{it}+\beta_{14} lnFDI_{i,t-1}+\varepsilon_{it}$$

Model 2b_II – Pre-games phase; without lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} Inflation_{it}+\beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} DDeveloping_{it}+\varepsilon_{it}$$

Model 2b_III – Pre-games phase; without lnGDP, with lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDPpc_{it}+\beta_9 Inflation_{it}+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}$$
$$+\beta_{12} DDeveloping_{it}+\beta_{13} lnFDI_{i,t-1}+\varepsilon_{it}$$

Model 2b_IV – Pre-games phase; without lnGDP and lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDPpc_{it}+\beta_9 Inflation_{it}+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}$$
$$+\beta_{12} DDeveloping_{it}+\varepsilon_{it}$$

Model 2b_V – Pre-games phase; without lnGDPpc, with lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDP_{it}+\beta_9 Inflation_{it}+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}$$
$$+\beta_{12} DDeveloping_{it}+\beta_{13} lnFDI_{i,t-1}+\varepsilon_{it}$$

Model 2b_VI – Pre-games phase; without lnGDPpc and lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpre_{it}+\beta_2 DSOpre_{it}+\beta_3 DWOpre_{it}+\beta_4 DWCpre_{it}+\beta_5 DUEFApre_{it}$$
$$+\beta_6 DACNpre_{it}+\beta_7 DCopaApre_{it}+\beta_8 lnGDP_{it}+\beta_9 Inflation_{it}+\beta_{10} lnTrade_{it}+\beta_{11} lnPop_{it}$$
$$+\beta_{12} DDeveloping_{it}+\varepsilon_{it}$$

Model 2c_I – Post-games phase; with lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpost_{it}+\beta_2 DSOpost_{it}+\beta_3 DWOpost_{it}+\beta_4 DWCpost_{it}+\beta_5 DUEFApost_{it}$$
$$+\beta_6 DACNpost_{it}+\beta_7 DCopaApost_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} Inflation_{it}+\beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} DDeveloping_{it}+\beta_{14} lnFDI_{i,t-1}+\varepsilon_{it}$$

Model 2c_II – Post-games phase; without lag FDI:

$$lnFDI_{it}=\beta_0+\beta_1 DSportEventpost_{it}+\beta_2 DSOpost_{it}+\beta_3 DWOpost_{it}+\beta_4 DWCpost_{it}+\beta_5 DUEFApost_{it}$$
$$+\beta_6 DACNpost_{it}+\beta_7 DCopaApost_{it}+\beta_8 lnGDP_{it}+\beta_9 lnGDPpc_{it}+\beta_{10} Inflation_{it}+\beta_{11} lnTrade_{it}$$
$$+\beta_{12} lnPop_{it}+\beta_{13} DDeveloping_{it}+\varepsilon_{it}$$

Model 2c_III – Post-games phase; without lnGDP, with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it} + \beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \beta_{13} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2c_IV – Post-games phase; without lnGDP and lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it} + \beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \varepsilon_{it}$$

Model 2c_V – Post-games phase; without lnGDPpc, with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it} + \beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 lnGDP_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \beta_{13} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2c_VI – Post-games phase; without lnGDPpc and lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventpost_{it} + \beta_2 DSOpost_{it} + \beta_3 DWOpost_{it} + \beta_4 DWCpost_{it} + \beta_5 DUEFApost_{it} + \beta_6 DACNpost_{it} + \beta_7 DCopaApost_{it} + \beta_8 lnGDP_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \varepsilon_{it}$$

Model 2d_I – Full period; with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \beta_{14} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2d_II – Full period; without lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDP_{it} + \beta_9 lnGDPpc_{it} + \beta_{10} Inflation_{it} + \beta_{11} lnTrade_{it} + \beta_{12} lnPop_{it} + \beta_{13} DDeveloping_{it} + \varepsilon_{it}$$

Model 2d_III – Full period; without lnGDP, with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \beta_{13} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2d_IV – Full period; without lnGDP and lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDPpc_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \varepsilon_{it}$$

Model 2d_V – Full period; without lnGDPpc, with lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDP_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it} + \beta_{12} DDeveloping_{it} + \beta_{13} lnFDI_{i,t-1} + \varepsilon_{it}$$

Model 2d_VI – Full period; without lnGDPpc and lag FDI:

$$lnFDI_{it} = \beta_0 + \beta_1 DSportEventtot_{it} + \beta_2 DSOtot_{it} + \beta_3 DWOtot_{it} + \beta_4 DWCtot_{it} + \beta_5 DUEFAtot_{it} + \beta_6 DACNtot_{it} + \beta_7 DCopaAtot_{it} + \beta_8 lnGDP_{it} + \beta_9 Inflation_{it} + \beta_{10} lnTrade_{it} + \beta_{11} lnPop_{it}$$

$+\beta_{12} DDeveloping_{it} + \varepsilon_{it}$

Appendix F. ***Does the model provide empirical support for the hypothesis?***

	H1a	H1b	H1c	H1d	H2a	H2b	H2c	H3a	H3b
Model 1a	No	No	No	Yes	*	*	*	*	*
Model 1b	No	No	No	Yes	*	*	*	*	*
Model 1c	No	No	Yes	**?**	*	*	*	*	*
Model 1d	No	No	No	Yes	*	*	*	*	*
Model 1_SME	No	No	*	Yes	*	*	*	*	*
Model 1_DSO	No	No	Yes	No	*	*	*	*	*
Model 1_DWO	No	No	Yes	Yes	*	*	*	*	*
Model 1_FIFA	No	No	*	Yes	*	*	*	*	*
Model 1_UEFA	No	No	*	Yes	*	*	*	*	*
Model 1_ACN	No	No	*	Yes	*	*	*	*	*
Model 1_CopaA	No	No	*	Yes	*	*	*	*	*
Model 2a_I	*	*	*	*	No	No	Yes	*	*
Model 2a_II	*	*	*	*	No	No	Yes	*	*
Model 2a_III	*	*	*	*	No	No	Yes	*	*
Model 2a_IV	*	*	*	*	No	No	Yes	*	*
Model 2a_V	*	*	*	*	No	No	Yes	*	*
Model 2a_VI	*	*	*	*	No	No	Yes	*	*
Model 2b_I	*	*	*	*	No	No	Yes	*	*
Model 2b_II	*	*	*	*	No	No	Yes	*	*
Model 2b_III	*	*	*	*	No	No	Yes	*	*
Model 2b_IV	*	*	*	*	No	No	Yes	*	*
Model 2b_V	*	*	*	*	No	No	Yes	*	*
Model 2b_VI	*	*	*	*	No	No	Yes	*	*
Model 2c_I	*	*	*	*	No	Yes	No	*	*
Model 2c_II	*	*	*	*	No	Yes	No	*	*
Model 2c_III	*	*	*	*	No	Yes	No	*	*
Model 2c_IV	*	*	*	*	No	Yes	No	*	*
Model 2c_V	*	*	*	*	No	Yes	No	*	*
Model 2c_VI	*	*	*	*	No	Yes	No	*	*
Model 2d_I	*	*	*	*	No	Yes	Yes	*	*
Model 2d_II	*	*	*	*	No	Yes	Yes	*	*
Model 2d_III	*	*	*	*	No	Yes	Yes	*	*

Model 2d_IV	*	*	*	*	No	Yes	Yes	*	*
Model 2d_V	*	*	*	*	No	Yes	Yes	*	*
Model 2d_VI	*	*	*	*	No	Yes	Yes	*	*
Model 3a_I	*	*	*	*	*	*	*	No	*
Model 3b_I	*	*	*	*	*	*	*	No	*
Model 3c_I	*	*	*	*	*	*	*	No	*
Model 3d_I	*	*	*	*	*	*	*	No	*
Model 3_Dev	*	*	*	*	*	*	*	No	*
Model 3_Adv	*	*	*	*	*	*	*	No	*
Model 4a_I	*	*	*	*	*	*	*	*	No
Model 4a_II	*	*	*	*	*	*	*	*	No
Model 4a_III	*	*	*	*	*	*	*	*	No
Model 4b_I	*	*	*	*	*	*	*	*	No
Model 4b_II	*	*	*	*	*	*	*	*	No
Model 4b_III	*	*	*	*	*	*	*	*	No
Model 4c_I	*	*	*	*	*	*	*	*	No
Model 4c_II	*	*	*	*	*	*	*	*	No
Model 4c_III	*	*	*	*	*	*	*	*	No
Model 4d_I	*	*	*	*	*	*	*	*	No
Model 4d_II	*	*	*	*	*	*	*	*	No
Model 4d_III	*	*	*	*	*	*	*	*	No

Note 1: An asterisk (*) means that this model is not applicable to this hypothesis.
Note 2: A question mark (**?**) indicates that the result was mixed.
Note 3: Based on the estimates obtained from the multiple regression models that were utilized in this paper, hypothesis 1c, 1d, and 2b cannot be rejected.