# WINNING MEDALS AT THE OLYMPIC GAMES - DOES CROATIA HAVE ANY CHANCE? 

Zrinko Čustonja and Sanela Škorić<br>University of Zagreb, Faculty of Kinesiology, Zagreb, Croatia

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#### Abstract

: As the Olympic Games developed and their popularity and relevance grew, winning medals also became important and a matter of national and political prestige. Despite the International Olympic Committee's refusal to recognize country rankings by medals, the medal table is updated on a regular basis and plays a dominant role in media coverage and public interest (Rathke \& Woitek, 2007). This has led researchers to explore the socio-economic, cultural and geographic background of Olympic achievements. The aim of this paper was to review the current state of the research on factors that influence national Olympic Games success. The majority of studies consider variables like: population size, GDP and GDP per capita, hosting or neighbouring country advantage, political system, sports system, health expenditure per capita, climate, etc., as factors that potentially have impact on a country's medal count. The research has shown that the economic factor, mainly GDP per capita, and political system have a statistically significant influence on the explanation of the numbers of medals won by a certain country at the Olympic Games, but the influence of population size was not confirmed. Keeping in mind the mentioned factors, it is unlikely for Croatia to increase significantly its number of Olympic medals in the future.


Key words: medal count, gross domestic product, population size, political system

## Introduction

Pierre de Coubertin's idealistic concept was that the most important thing in the Olympic Games is not winning but taking part. This means that the genuine Olympic spirit emphasizes participation rather than winning. However, as the Olympic Games were gaining in participation and popularity ${ }^{1}$, winning medals became important and a matter of national and political prestige. This is proven by the fact that the IOC (International Olympic Committee) publishes information on the number of medals won by a single country participating at the Olympic Games (either winter or summer), and this can be found on the IOC web pages (see IOC, 2009b).

Similar happened with the idea that the Olympic Games were created for the glorification of the individual champion. Even nowadays, according to the Olympic Movement (2007), "the Olympic Games are competitions between athletes
in individual or team events and not between countries". However, Rathke and Woitek (2007) note that "despite this idealistic statement and the IOC's refusal to recognize country rankings by medals, the medal table is updated on a realtime basis and plays a dominant role in media coverage and public interest".

The tremendous interest in national Olympic achievement has led researchers to explore the socioeconomic, cultural and geographic underpinnings of Olympic success. As stated by Roberts (2006), "the intent of such research has not been to discount the primary importance of individual athletic talent, but rather to explore the fundamental factors affecting the ability of this talent to develop, flourish, and ultimately win medals at the Olympics".

The Olympic movement celebrates the spirit of international competition, of global athletic excellence. Yet not all nations have an equal ability or will to participate in the Games, nor do they have

[^0]an equal ability to win medals if they do participate. According to the IOC (2010), about 11,000 athletes from 204 countries (the record-breaking number of countries!) competed for medals in 302 events at the 2008 Summer Olympic Games in Beijing. In total 957 medals were distributed (Wikipedia, 2010) ${ }^{2}$. Overall, more than half ( $56 \%$ ) of all the medals ( 542 medals) and $64 \%$ of all the gold medals (194 gold medals) were won by the top ten countries which represented only one third of the world population. If we were to exclude China from these top ten, the nine remaining countries, with the world population share of about $14 \%$, won almost a half of all the gold medals. About $57 \%$ of all the participating countries (117) did not win any medal, and only one out of four participating countries succeeded in winning at least one gold medal ( 52 countries).

However, a greater distribution of medals won at the Olympics to a greater number of countries can be noticed. Since the 1988 Olympic Games in Seoul when the five strongest national teams won $64 \%$ of all the gold medals, the Olympic Games have become more competitive and in Athens 2004 their share had shrunk to $42 \%$. Accordingly, in 1988 gold medals were won by 31 countries, while in Athens 56 countries managed to win a gold medal. One of the factors why the number of countries increased after 1988 was the collapse of the communist system in the Middle and Eastern Europe. In Athens 7 out of the 56 gold medal winning nations were new states born after 1990 (Figure 1).

Since all nations do not have an equal opportunity to participate in the Olympic Games, nor do they have an equal chance to win medals at the Games, what are the determinant factors that have an impact on a country's medal count? In that sense, the aim of this paper was defined and it is to review the current state of the research concerning the factors that influence national Olympic Games success.

The theoretical background for this type of study is simple: it is assumed that athletic talent, as most physical attributes, is most likely distributed normally in the population. If medal-calibre athletes were randomly distributed in the world population, one would expect the medal share of a country to equal its share of population among the participating countries at the Olympics (Bernard \& Busse, 2000; Lui \& Suen, 2008). However, as has been already demonstrated, this is not the case. The data were usually studied through various econometric analyses based on the sample of one event or a number of events over a certain time period (see Kuper \& Sterken, 2001). Most studies concerning this topic consider economic, sociological and other variables like: population size, GDP and GDP per capita, hosting or neighbouring country advantage, political system, sports system, health expenditure per capita, climate, etc., as will be shown.

## Population size and economic factors

To our knowledge, the first study to analyse the factors influencing success at the Olympic Games appeared after the 1952 Olympic Games in Helsinki. According to Rathke and Woitek (2007), Jokl and co-authors (1956), in the study Sports in the Cultural Pattern of the World: A Study of the Olympic Games 1952 at Helsinki, were the first to use Gross Domestic Product index (GDP) or GDP per capita as a potential predictor of Olympics success. Using GDP is more than justifiable since it can indicate a country's economic development and assumptions can be made about the resources for enabling athletes to be committed to sports preparation, building and maintaining training facilities, developing advanced educational system for coaches, supporting scientific research and consequently developing cutting edge training methods. Numerous recent studies used GDP or GDP per


Figure 1. Olympic gold medals distribution (source: www.olympic.org).

[^1]capita as a variable in the national Olympic Games success investigations (Bernard \& Busse, 2000, 2004; Groot, 2007; Johnson \& Ali, 2000, 2004; Kuper \& Sterken, 2001; Lui \& Suen, 2008; Matros \& Namoro, 2004; Rathke \& Woitek, 2007; Roberts, 2006).

Further, the importance of population size to Olympic success is a logical assumption. The size of population, if nothing else, determines how large the pool of potential talents for future national achievements is. However, enough examples of countries like India, Bangladesh, Thailand, Brazil, Indonesia, Nigeria, Pakistan or Iran, that despite large populations have relatively low success rates at the Olympic Games, can be found. Nevertheless, in combination with GDP as an economic indicator, the size of population is the most frequently used parameter in these studies (Bernard \& Busse, 2000, 2004; Groot, 2007; Johnson \& Ali, 2000, 2004; Kuper \& Sterken, 2001; Lui \& Suen, 2008; Matros \& Namoro, 2004; Rathke \& Woitek, 2007; Roberts, 2006).

Bernard and Busse (2000) addressed the question of how many Olympic medals a country should win regarding its size of population and economic power. They began with the simple hypothesis that "athletic talent is most likely distributed normally in the world's population" (2000), and therefore the number of medals won by a single country should be proportional to its population size, that is to say, to "its share of the total population of countries participating in the Olympics" (2000). However, due to the reasons related to the structure of the Olympics, this does not hold in practice (see Bernard \& Busse, 2000). Therefore, the authors concluded that the size of population could not adequately explain the distribution of medals across countries. Also, there was a significant evidence that other resources, GDP in particular, was the best predictor of national Olympic performance. They calculated that if the average country were to double its total GDP, it could expect the number of medals it won to rise by $1-1.5 \%$ of the total of the awarded medals. Their model also included the variables such as host country and political system (connected with boycott years), as well as lagged medal share (past success as an indicator of current success).

Other studies reported the population size was insignificant in explaining medal counts. For example, Roberts (2006), using count data econometric analysis, examined only the 2004 Olympic Games and concluded that population size is insignificant in explaining the national medal count. Rathke and Woitek (2007) reported that "the sign of the population size effect depends on the wealth and
population size of a country", that is, the effect of population is "positive only for relatively rich countries". According to them, only very rich counties with a relatively small population can gain from population increase, which seems reasonable as one would expect that, for poor countries, a population increase reduces resources available for the production of Olympic success. Nevertheless, the studies of Johnson and Ali $(2000,2004)$, Lui and Suen (2008), and Matros and Namoro (2004) found that population size together with GDP and other factors had positive effects on Olympic achievements.

Johnson and Ali (2000) investigated whether population size and GDP had any influence on the number of all athletic participants at the Olympic Games by a nation, as well as on the number of female athlete participants at the Olympics by a nation and Olympic success. They concluded that there was a "significant and measurable advantage to larger nations (both in GDP per capita and in population size) in terms of participation and success at the Games". Also, according to the same study "nations with higher GDP per capita send more participants and more female participants, with an effect that is nonlinear for total participants in particular. Richer nations send more athletes, at the rate of roughly 8 more for each thousand of dollars of GDP per capita on average". Furthermore, "nations with larger populations also send more athletes, although that effect tapers off with extreme size. This is a natural result of the finite number of events at any Games. Since there is a limitation on the number of teams that any nation may send in one sport, large nations will not be able to send as many athletes as their populations would suggest". Extending their study in 2004 with the data from the Olympic Winter Games, Johnson and Ali (2004) obtained similar results regarding the number of participants at the Olympics.

These results were supported by the Kuper and Sterken (2001). They collected data for all the Olympic Games from 1896 until 2000. Confirming the importance and contribution of the share of income per capita to the participation share, Kuper and Sterken (2001) calculated that "if a country increases its income share by 1 percentage point, participation is increased by about .8 percentage points" ${ }^{3}$. They noted that the "Olympic participation is not proportional to the absolute size of the population", as well as that the population share contributes importantly to participation shares, although its impact is decreasing". Kuper and Sterken (2001) also concluded that besides income per capita, other factors like home advantage, political system, etc.,

[^2]influenced national participation rate and success at the Olympics.

Regarding the influence of economic conditions of a country on Olympic success, the results of Johnson and Ali (2000, 2004), Bernard and Busse (2000, 2004), Matros and Namoro (2004), Kuper and Sterken (2001), Roberts (2006), Rathke and Woitek (2007) and Lui and Suen (2008) suggested that high GDP per capita was associated with success at the Olympic Games. Roberts (2006) concluded that GDP per capita had a positive impact but showed decreasing returns to scale (a smaller positive impact at higher levels of GDP per capita). He calculated that increase in GDP per capita of $\$ 10,000$ would increase the medals count by approximately two medals. The effect is more pronounced for the gold medals than for all medals, with much larger nations seeing very little increase in the gold medal counts for each successive increase in size. However, a small decrease in importance of economic conditions to Olympic success comparing to other factors was reported by Kuper and Sterken (2001), especially after the World War II Olympic Games.

Although the studies used different statistical models and research methodology, the influence of GDP per capita and population size on the medals won at the Olympics, they can, in some way, explain why richer and larger countries win more medals at the Olympics. Nevertheless, this approach relying only on the population and economic factors has its limitations, as has been explained by Matros and Namoro (2004): "For example, former European socialist countries have experienced dramatic changes in their Olympic performances. These changes can hardly be accounted for by observing the trends in indicators such as the per capita GDP, population, etc". Countries like Bulgaria, Hungary, Poland and those that formed the former Soviet Union experienced a drastic drop after 1988 in the number of medals won. Moreover, "the total number of medals won by the unified Germany in 2004 is, by far, fewer than the number of medals won by East Germany alone in 1988. The changes in the GDP per capita and the populations of these countries are disproportionate to the changes in the number of medals won" (Matros \& Namoro, 2004). The logical assumption is therefore that other factors influence Olympic success more than pure GDP and the size of population. Also, no single nation is able to dominate the Olympic Games in all sports. If that was the case, success would be based solely on population size and GDP (per capita) for each country.

## Political system

During the Cold War era sport and the Olympic Games were strongly influenced by politics. Promotion of countries and their political systems through

Olympic success were very much endorsed by the highest political levels. That was predominantly the case in the former communist countries like the Soviet Union, the Democratic Republic of Germany, Bulgaria or Yugoslavia. At the Olympic Summer Games in Seoul 1998, for instance, the Democratic Republic of Germany, with the population of about 17 millions, won more gold medals (37) than the USA (36). About 56\% of all gold medals (133) went to the communist countries, while five communist countries (accounting for only $4.1 \%$ of the world population) in the top ten won 120 gold medals or about $50 \%$ of all gold medals. Although extensive claims have been made that the use of doping may have played a certain role in these results, these former communist countries have undoubtedly shown that purposive sport policy can "breed" Olympic success (Groot, 2007). Therefore, it was logical to include the variable political system in the studies that tried to explain what produced Olympic medals.

Johnson and Ali (2004) argued that countries with the single-party political system and communist regime sent a similar number of athletes to the Olympics as the non-communist countries, but won more medals in both the Summer and Winter Olympics. A higher medals count for communist countries than expected was confirmed by Bernard and Busse $(2000,2004)$ and Kuper and Sterken (2001). Matros and Namoro (2004) argued that the change in the political system of communist countries to free market economy resulted in a lower medals count at the Olympics. Rathke and Woitek (2007) reported that the former communist countries used to outperform the other participants in absolute terms, given the same amount of available resources. These studies confirmed that in the past countries with the communist political system outperformed their counterparts. However, in the post Cold War era, the effect of having the communist political system or being a former communist nation is no longer significant (Roberts, 2006).

Apart from the previously mentioned and most commonly used factors, other potentially significant variables influencing Olympic success, like host nation advantage, climate conditions, etc., can also be found in the current literature.

## Hosting the Olympic Games and other factors

According to Bernard and Busse (2000) "host countries typically win an additional 1.8 percent of the medals beyond what would be predicted by their GDP alone". Similar results were reported by Johnson and Ali (2000) as well as by Rathke and Woitek (2007). They indicated undeniably large advantages of being the hosting nation, both in terms of participation and medal counts. Lui and

Suen (2008) predicted that at the 2008 Olympic Games China would win about $14 \%$ more medals than in 2004 only on account of hosting the Games. Kuper and Sterken (2001) underlined that a host effect is strong, especially for participation, but it used to be more important at the older editions of the Games. Such a host effect was not confirmed by Roberts (2006).
"Environmental determinism was the dominant mode of geographical thought during the late nineteenth and for much of the first half of the twentieth century" (Bale, 2000). This was also the time when Jokl with his associates (1956) published his work on factors of Olympic success. "Climate was seen to be the main determinant of human activity", and much of Africa, Asia, Latin America and Russia were seen to be low in climatic efficiency in contrast to north-west Europe (see Bale, 2000). This was not confirmed by Jokl, since "several countries in the 'low energy zones' collected as many points per million inhabitants as several in the 'better' climatic zones" (Bale, 2000). Jokl and associates (1956) also found a weak negative correlation between a nation's distance from Helsinki and its Olympic performance, meaning that "the further the country from Helsinki, the 'poorer' its performance - but with many residuals off the regression line" (Bale, 2000).

Based on the assumption that countries with warmer climates (Australia, China, Russia and the USA) or colder humid countries (Canada and Sweden) are expected to win more medals, Johnson and

Ali (2000) and Roberts (2006) indicated that the colder-climate nations performed better than the warmer-climate ones.

Some other factors like health expenditure per capita (Roberts 2006), education and life expectancy (Lui \& Suen, 2008) were found not contributing to Olympic success.

Finally, "a post-cold war view of the Games provides an additional explanation closer to the Olympic ideals since it takes into account individual athlete performances, culture and sporting disciplines" (for more detail see Andreff, M., Andreff, W., \& Poupaux, 2008).

## Croatia and Olympic success

Croatian athletes competed for the first time at the Olympics in 1992 at the Olympic Winter Games in Albertville. Since then Croatia has won 17 medals (three gold, six silver and eight bronze medals) at the Olympic Summer Games (Table 1) and 7 medals (four gold and three silver medals) at the Olympic Winter Games (Table 2).

With the growing competition at the international level, a country like Croatia must consider factors that contribute to Olympic success in order to maintain its good Olympic results or even to increase them. However, no such research exists in Croatia. If we were to consider all the previously mentioned factors of Olympic success and tried to answer the question in the title of the paper, it would be possible to draw some conclusions, but with certain limitations.

Table 1. Croatian medals at the Olympic Summer Games

| OLYMPIC SUMMER GAMES | Number of athletes | GOLD | SILVER | BRONZE |
| :--- | :---: | :---: | :---: | :---: |
| $\mathbf{1 9 9 2}$ | 39 | 0 | 1 | 2 |
| $\mathbf{1 9 9 6}$ | 85 | 1 | 1 | 0 |
| $\mathbf{2 0 0 0}$ | 89 | 1 | 0 | 1 |
| $\mathbf{2 0 0 4}$ | 81 | 1 | 2 | 2 |
| $\mathbf{2 0 0 8}$ | 101 | 0 | 2 | 3 |
| TOTAL | 395 | $\mathbf{3}$ | $\mathbf{6}$ | $\mathbf{8}$ |

Source: according to the Croatian Olympic Committee (2008a) and internal data of the Croatian Olympic Committee.

Table 2. Croatian medals at the Olympic Winter Games

| OLYMPIC WINTER GAMES | Number of athletes | GOLD | SILVER | BRONZE |
| :--- | :---: | :---: | :---: | :---: |
| $\mathbf{1 9 9 2}$ | 4 | 0 | 0 | 0 |
| 1994 | 3 | 0 | 0 | 0 |
| 1998 | 6 | 0 | 0 | 0 |
| $\mathbf{2 0 0 2}$ | 14 | 3 | 1 | 0 |
| 2006 | 23 | 1 | 2 | 0 |
| TOTAL | 50 | 4 | 3 | 0 |

[^3]For example, the mentioned reports about the impact of population size and economic factors (in most cases GDP per capita) are not encouraging for countries like Croatia. A relatively small population size and, comparing to the richest nations, low GDP per capita does not promise significant rise of the Olympic medals count in the future. Nevertheless, unclear data regarding the importance of population size and, in recent studies (Roberts, 2006; Kuper \& Sterken, 2001), a not so high GDP per capita influence, as well as the importance of other factors to winning Olympic medals, could open some space for future optimism for Croatia. Nevertheless, in the 2004 Olympic Games with the five medals won, Croatia was ranked $44^{\text {th }}$, and Switzerland (also five medals) was ranked $46^{\text {th }}$ (Olympic Movement, 2004).

Furthermore, the past experience of a strong political will in former communist Yugoslavia to do well at the international sport level could be used, with certain modifications, in countries like Croatia. As a nation, Croatia has a good tradition of government and public interest in sport. Nowadays one may use this public interest in sport for a good and strategic use of resources in order to develop a new elite sport system as well as for the mobilization of new resources by the government. According to the findings presented in this paper, it seems that only a strategic approach to sport development at the governmental level, can affect future success at the Olympic Games for Croatia.

However, it has to be emphasized that strong and legitimate conclusions regarding the stated question cannot be made without a detailed econometric analyses. Since no such analysis has been done
in Croatia or for Croatia, this paper serves as a preliminary analysis of this matter. Therefore, it is in the hands of the authors to draw attention to this issue and emphasize the need for further research in this area, as well as to conduct the necessary studies in the future.

## Croatian prospects

After reviewing the current state of the research on factors that influence national Olympic Games success, it can be concluded that an economic factor, mainly GDP per capita, has a statistically significant influence on the explanation of the numbers of medals won by a certain country at the Olympic Games. Although logically expected, the reported research data do not firmly support the relevance of the national population size to Olympic Games success. The importance of a political system in winning Olympic medals was confirmed especially in the case of the former communist countries. Hosting the Olympic Games and certain climate conditions also significantly contribute to Olympic success.

Keeping in mind all the previously mentioned factors, it is unlikely for Croatia to increase significantly the number of Olympic medals its athletes will win in the future. However, this prediction can be confirmed only by a detailed statistical analysis of this matter in the future. Nevertheless, it can be said that only a strategic approach to sport development, that is to a good and strategic use of the resources for developing an effective sport system, as well as to the mobilization of new resources by the government, can make a difference in future achievements at the Olympic Games for Croatia.

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Correspondence to:
Zrinko Čustonja, MagEd
Faculty of Kinesiology University of Zagreb
Horvaćanski zavoj 15, 10000 Zagreb
Phone: + 38513658717
E-mail: zcustonja@kif.hr

## OSVAJANJE MEDALJA NA OLIMPIJSKIM IGRAMA - IMA LI HRVATSKA IKAKVE SANSE?

Kako su se Olimpijske igre i olimpijski pokret razvijali, kako je rasla njihova popularnost i relevantnost, tako je i osvajanje medalja postajalo važnim i stvar nacionalnoga i političkoga prestiža. Unatoč odbijanju Međunarodnoga olimpijskoga odbora da službeno prihvati poredak zemalja prema osvojenim medaljama, tablice s osvojenim medaljama pojedinih zemalja redovito se objavljuju neslužbeno, a često igraju dominantnu ulogu u prijenosima sportskih događaja i izazivaju velik interes javnosti. To je navelo istraživače na potragu za socioekonomskim, kulturnim i geografskim čimbenicima olimpijskih uspjeha. Cilj je ovoga rada dati pregled sadašnjega stanja istraživanja o čimbenicima koji utječu na uspjeh pojedinih država na Olimpijskim igrama. Većina studija uzima u obzir varijable kao što su: broj stanovnika, BDP i BDP po glavi stanovnika,
domaćinstvo igara ili održavanje igara u susjednoj zemlji, politički sustav, sportski sustav, izdaci za zdravstvo po glavi stanovnika, klimatske osobitosti itd., kao faktore koji utječu na to koliko će pojedina zemlja osvojiti medalja. Istraživanja su pokazala da ekonomski faktor, najčešće BDP po glavi stanovnika, statistički značajno utječe na objašnjenje broja medalja koje osvaja određena zemlja na Olimpijskim igrama, kao i politički sustav. Utjecaj veličine populacije nije potvrđen. Imajući u vidu navedene čimbenike, malo je vjerojatno da će Hrvatska znatno povećati broj osvojenih medalja na Olimpijskim igrama u budućnosti.

Ključne riječi: broj olimpijskih medalja, bruto domaći proizvod, broj stanovnika, politički sustav


[^0]:    1 At the beginning the competition was not fierce in most events (see Kuper \& Sterken, 2001). Also, the number of participants since the first modern Olympic Games, held in Athens in 1896, grew from 241 athletes in 43 events (IOC, 2009) to 10,625 athletes in 301 events at the 2004 Games held also in Athens (IOCa, 2009). At the same time the popularity of the 2004 Games "soared, as 3.9 billion people had access to the television coverage" (IOCa, 2009).

[^1]:    2 The total medal count is more than three times the number of disciplines, because sometimes medal winning athletes end exactly equal, in which case a double bronze, silver or gold medal is awarded (see Groot, 2007).

[^2]:    ${ }^{3}$ Note that this calculation is not in absolute but in relative figures. The GDP share is the share of GDP per capita of a country as a percentage of the total GDP per capita of the 118 sample countries (Kuper \& Sterken, 2001).

[^3]:    Source: according to the Croatian Olympic Committee (2008b) and internal data of the Croatian Olympic Committee.

