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# Is India the exception? - The Impact of Economic Growth on the Competitiveness of National Elite Sport Systems

**Klaus Nielsen**
**Rasmus Storm**
k.nielsen@mbs.bbk.ac.uk
rasmus.storm@idan.dk

**Birkbeck, University of London**

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## Abstract

India is the extreme under-achiever in international sport competitions. This has only marginally changed with the recent promotion of the Indian economy into the league of BRIC nations. Whereas in China high growth rates have been accompanied by a huge improvement of its performance in international sport events a similar impact of extraordinary growth rates has been almost totally absent in the case of India. Is India an exception? Several econometric studies have shown that income per capita is a significant variable explaining elite sport results such as results in the Olympic Games. From this stylized fact follows the hypothesis that 'above/below average' growth rates lead to relative improvements/deterioration of elite sport results (with a time lag)". This paper tests the hypothesis by means of a study of the correlation between growth in GNP per capita and growth in medal points in the sports of the Olympic Summer Games. The findings show no correlation. However, a detailed analysis of country evidence shows interesting trends and details. The paper concludes with tentative explanations for the findings including the contradictory country evidence.



**Keywords:** Elite sport systems, Economic growth, Competitiveness, Olympic Games, National differences.

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## Introduction

India is the extreme under-achiever in international sports competitions. This has only marginally changed with the promotion of the Indian economy into the league of high growing BRIC nations. Recent performances at the Commonwealth Games 2010 and at world championships in shooting, archery, badminton, boxing and shooting may indicate new trends. However, the long-term indicators show a low level of competitiveness and only marginal recent improvements. In total, India has won only 20 medals in Olympic Games of which 11 were in field hockey (1928-1980) where the once totally dominant Indian team has now for decades been a second tier international force. Actually, of those countries that have won at least one medal, India is the country in the world with the lowest number of total Olympic medals per capita.[1] Whereas in China high growth rates have been accompanied by a huge improvement in its ranking in international sport events a similar impact of extraordinary growth rates has been almost totally absent in the case of India. Is India an exception? Or, is China rather a unique or extreme case?

Several econometric studies have shown that income per capita is a significant variable explaining elite sport results such as results in the Olympic Games. From this stylized fact follows the hypothesis that high economic growth rates lead to relative improvements of elite sport results, and vice versa, although with a time lag. This has not been tested previously, and the contingencies explaining the seemingly widely different developments in countries such as China and India have not been explored. This paper tests the hypothesis by means of a study of the correlation between growth in GNP per capita and growth in medal points (no. 1: five points, no. 2: three points, no.3: two points) in Olympic

[1] Per Capita Olympic Medal Table, http://users.skynet.be/hermandw/olymp/reloly.html.

Summer Games. The findings show no correlation between economic growth and international sporting success. However, an analysis of the country case evidence reveals interesting details and trends.

The structure of the paper is as follows. First, the links between economic growth, elite sport development and success in international sports competitions are discussed. The second part outlines the methodology of the study. In the third part, the findings are presented. Then follows two sections with discussion of the findings; first, the results of the calculations; second, the case evidence. A concluding summary ends the paper.

## Economic growth, elite sport development and international sporting success

Several studies argue that macro level factors account for a significant part of the international sporting success potential of a given nation[2]. Factors like economic welfare (Gross Domestic Product, or GDP), population size, and geographic and climatic variation add up to explain approximately 50% of a nation's medal portfolio.

The best predictor of international sporting success appears to be the absolute allocation of financial resources to elite sports: *"(…) for countries to establish and then sustain a*

[2] Bernard and Busse, Who wins the Olympic Games: Economic resources and medal totals. De Bosscher, Sports policy factors leading to international sporting success. De Bosscher et al., The Global Sporting Arms Race. De Bosscher et al., Comparing relative sporting success among nations. Den Butter and Van der Tak, Olympic Medals as an Indicator of Social Welfare. Johnson and Ali, Coming to Play or Coming to Win: Participation and Succes at the Olympic Games. Kiviaho and Mäkelä, Olympic Success: A sum of non-material and material factors. Morton, Who won the Sydney 2000 Olympics?. Stamm and Lamprecht. Sydney 2000, the best games ever. Storm and Nielsen, Dansk eliteidræts konkurrenceevne: Resultater, målemetoder og investeringer.

*successful elite sport development system in the early twenty first century they have to 'Pay up! Pay up! And play the game!"*[3]

The capacity for allocating increasing financial resource to elite sports depends largely on economic growth. With higher GDP per capita growth follows better possibilities for investing increasing resources in the development of elite sports. Of course, the willingness to invest financial resources in elite sports depends on political priorities. However, if we assume that political priorities towards investment in elite sports relative to other purposes do not change when growth rates change we should expect a direct link between growth in GDP per capita and increased financial resources for elite sports. A more credible assumption would be to see investment in elite sports as a luxury good (income elasticity higher than one). This would imply that the percentage increase in elite sports investment would be higher than the increase of income under economic growth. This merely reinforces the argument of a clear positive link between economic growth and growth in financial resources available for elite sports. Assuming that invested financial resources is the best predictor for international sporting success as evidenced in the literature we have the following hypothesis:

Above/below average growth in GDP per capita leads to relative improvement/deterioration of elite sport results (with a time lag).

[3] Houlihan and Green, Comparative Elite Sport Development, 291. See also Van Hilvoorde et al., How to influence national pride, 88; De Bosscher, Sports policy factors leading to international sporting success, 245; De Bosscher et al., The Global Sporting Arms Race,122; Hogan and Norton. The Price of olympic gold; Oakley and Green, The Production of Olympic Champions.

## Methodology

Standard IMF data for GDP per capita (ppp) are used to calculate the independent variable (growth in GDP per capita). Similar standard measures for the dependent variable (elite sports results) do not exist. In this study, we use medals in Olympic Summer Games as a measure for international sporting success. This is an often used indicator. Other studies use either medal table ranking (based on number of, first gold medals, second silver medals, and third bronze medals) or total number of medals. Our measure is medal points (no. 1: five points, no. 2: three points, no.3: two points). The specific allocation of points is an attempt to reflect common perceptions of relative medal value: one gold medal is as good as one silver plus one bronze; the value of a gold medal, relative to a silver medal, is higher than the value of a silver medal, relative to a bronze medal. Furthermore, we include data from not only years with Olympic Games, but also results from years in-between the Olympic Games since 1996. We use a unique data base with annual results in world championships or similar competitions or rankings in all Olympic disciplines from 1997 and onwards (see appendix 1). This makes it possible to correlate annual standard data for the independent variable with a measure for the dependent variable that includes data for every fourth year until 1996 and every year since then.

The hypothesis assumes the existence of a causal link between the IV and the DV. Evidence of correlation does not prove causality even if reverse causality is not relevant in this case. However, the link may be spurious because of third variable effects such as state capacities and managerial efficiency. Such variables may also have strong direct effects on the dependent variable. For instance, strong political commitment to strengthen the nation's elite sports competitiveness may result in improved results independent of

economic growth. If the direct effects of third variables vary across countries, the hypothesis cannot be expected to hold. The case evidence is used to discuss the effect of third variables.

The issue of time lags is complex. Some of the effects of above average growth in GDP per capita are immediate in the sense that increased income dependent revenues of sports federations can be used to improve competitive conditions of a nation's athletes. However, most of the impacts are medium or longer term. This is partly because implementation of investments takes time and partly, and this is probably the most important link, because it takes time from investment of increased financial resources until the corresponding effect in terms of relative improvement of elite sport results. Conversely, although some of the effects of below average rates of GDP per capita growth may be immediate, by far most of the expected negative impacts on elite sport results are no doubt medium or long term. In the calculations different time lags were used.

## Findings

Several calculations were made using different time lags and different measures for the two variables: the IV (GDP per capita growth) and the DV (medal points). The following time lags were used: no time lag, one year, four years, and eight years. Time lags in the form of longer time span for the IV (e.g. 1996-2008) than the DV (e.g. 2004-2008) were also applied. The IV was measured by means of annual figures and five- or nine-year averages. The DV was measured as annual figures or in the form of differences between the figures at the start and the end of (four or eight years) periods. In all calculations with

figures from periods longer than one year, the figures from the start and the end of a period were calculated as five-year moving averages.

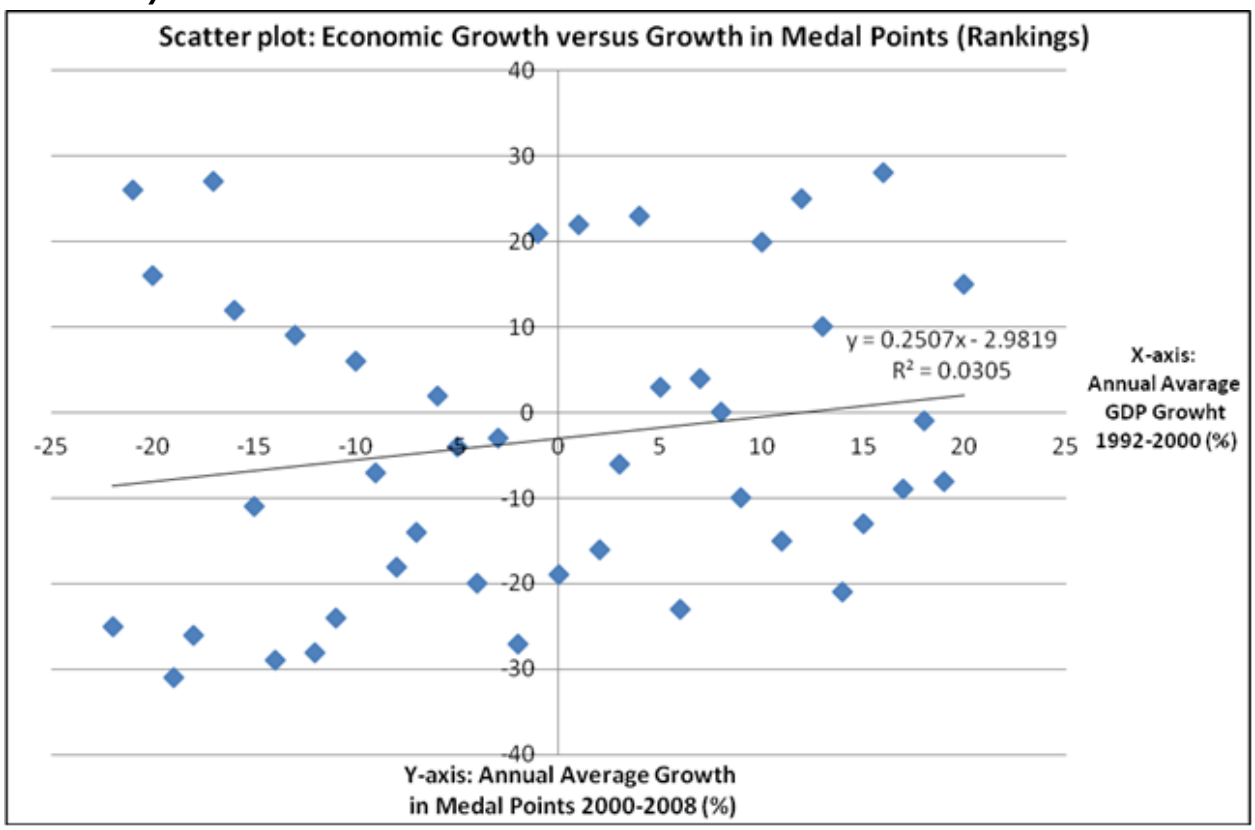
Most of these calculations lead to inconclusive results which may be interpreted as evidence that there is no link between economic growth and international sporting success in the short run. The most useful results originate from calculations using a time lag of eight years. Longer time lags may prove more useful but this has not been tested.

Various calculations using eight-year time lags were made. They showed a very weak positive correlation in accordance with the hypothesis. Below the results of one such calculation is outlined and discussed. It shows the correlation between average growth rates of GDP per capita in 1992-2000 and growth/decline in medal points in the period 2000-2008. The figures for the years beginning and ending the eight-year periods were calculated as five-year moving averages. The growth rates and the figures for medal points are documented in appendix 2.

Growth rates over eight-year periods are normally positive and can easily be presented and compared on a cardinal scale. It is less straight-forward to present data for growth/decline in medal points and to compare with economic growth figures. The total number of medal points has increased over the years but only marginally, which means that the figures for the dependent variable consist of a number of observations with positive growth in medal points and others with negative growth in medal points. This complicates the calculation of coordination coefficients and presents challenges in relation to presentation of the finding. In our calculations we scaled the economic growth data to

make them comparable to the sports performance data (medal points). Rates of growth of GDP per capita were compared with average growth rates for each nation, and percentage growth above and below the average were given the signs (+) and (-), respectively. The data covering the largest 60 countries (except 17 countries where comparable GDP data are unavailable) are presented in figure 1 below (see also appendix 2). In the figure we use rankings instead of the absolute observations. The average observation is given the value 0 and countries are ranked from high positive numbers to high negative numbers reflecting decreasing rates of GDP per capita growth and decreasing percentage increase in medal points, respectively. For example, China is ranked no. 15 in relation to percentage increase in medal points (vertical axis) and no. 20 on the horizontal axis representing the highest percentage increase in GDP capita among the 43 countries included. Germany, on the other hand, experienced below average growth rates in the period 1992-2000 which is reflected in a ranking as no. -7 on the vertical axis. Germany also experienced a significant negative growth in medal points in the same period and is accordingly ranked as no. -14 on the horizontal axis.

**Figure 1: Annual growth in GDP versus annual growth in medal points (43 countries)**




**NB**: Whereas the ranking in relation to GDP per capita includes only 43 countries (from +20 to -22), the ranking in relation to percentage growth in medal points includes 60 countries (from +28 to -31) including countries (not plotted into the figure) where the corresponding GDP data are not available.

The figure shows a very weak but insignificant correlation illustrated by the linear regression line. The overall conclusion is that the evidence does not show any link between the independent and the dependent variable. Thus, the hypothesis is not confirmed.

The number of countries with positive or negative rankings on both variables (24) is almost equal to the number of countries with positive ranking in relation to one variable and negative ranking in relation to the other (19), or vice versa. This is another indicator of a weak but insignificant correlation between the two variables. Whereas the evidence from

the first group of countries is in accordance with the hypothesis, it is the opposite with the second group of countries. Table 1 lists the countries included in the analysis in four categories (I – IV), where I and III represents the countries where the evidence is in accordance with the hypothesis whereas II and IV represent countries where the opposite is the case.

The table shows interesting patterns and details. Most large countries are either in Group I or III. China, Great Britain, USA, and India, are among the countries with above average growth in both GDP per capita and medal points. Actually, India is the most extreme example of correlated growth in the two measures. It has the highest percentage improvement in medal points and only four countries had a higher growth in GDP per capita (China, Ireland, South Korea and Poland). This evidence may appear surprising. Far from being an exception to the general trend of growth leading to improvement of international elite sport results, our evidence shows that India is rather the most extreme example of a strong link between the two variables. The reason for this seemingly surprising result is a sudden increase in Indian medal points in recent years. India won three medals in the Olympics Games in 2008 compared to only one in 2000, and a clear improvement in the results in world championships and ranking list in the Olympic sport disciplines have happened in recent years, most significantly in 2010. This improvement results in a high relative growth in medal points, partly because of the very low base line starting point.

**Table 1: Four groups of countries**

| | |
|---|---|
| Group I: Above average growth in GDP per capita **and** above average percentage growth in medal points<br><br>▪ India<br>▪ Portugal<br>▪ China<br>▪ Great Britain<br>▪ Thailand<br>▪ Spain<br>▪ Belgium<br>▪ USA<br>▪ Canada<br>▪ The Netherlands | Group II: Below average growth in GDP per capita **and** above average percentage growth in medal points<br><br>▪ Jamaica<br>▪ Mongolia<br>▪ Kenya<br>▪ Japan<br>▪ Brazil<br>▪ New Zealand<br>▪ Ethiopia<br>▪ Italy |
| Group III: Below average growth in GDP per capita **and** below average percentage growth in medal points<br><br>▪ Nigeria<br>▪ Bulgaria<br>▪ South Africa<br>▪ Romania<br>▪ Morocco<br>▪ Bahrain<br>▪ Greece<br>▪ Turkey<br>▪ Mexico<br>▪ Switzerland<br>▪ Germany<br>▪ Argentina<br>▪ France<br>▪ Indonesia<br>▪ Austria | Group IV: Above average growth in GDP per capita **and** below average percentage growth in medal points<br><br>▪ Finland<br>▪ Ireland<br>▪ Sweden<br>▪ Norway<br>▪ Poland<br>▪ Hungary<br>▪ South Korea<br>▪ Australia<br>▪ Denmark<br>▪ Iran |

**NB1:** Within each group the countries are listed in a sequence according to the distance to the intersection between the axes, and the countries in italics are those where the correlation between the two variables is strong.

**NB2:** The Netherlands has average growth in medal points and moderate above average growth in GDP per capita. Austria has average growth in GDP per capita and significant decline in medal points ranking. The two countries are included in Group I and III respectively.

Among the countries with below average growth in GDP per capita a clear majority (14 out of 22) has also below average percentage growth in medal points. The group includes large countries such as Germany and France as well as Latin American (Mexico and Argentina) and South Eastern European countries (Turkey and Greece). The most extreme examples of countries with negative development of both variables are African (Nigeria, South Africa and Morocco) and Eastern European countries (Bulgaria and Romania).

The group of countries that have improved their relative standard in terms of medal points in spite of below average economic growth includes three countries from the top 10 countries in terms of total GDP (Japan, Brazil and Italy) and New Zealand. The most extreme examples of elite sport results improvement in spite of relative low economic growth in the analyzed period are Jamaica, Mongolia and Kenya.

Finally, there is a group of countries with above average economic growth and below average growth in medal points. In other words, the medal points of these countries have declined relative to other nations in spite of the fact that above average economic growth has provided these countries with potentially increased resources available for investment in elite sports. This group of countries includes Australia and South Korea, all four Nordic European countries, and the fast growing economies in Central and Eastern Europe (Poland and Hungary) and another (until recently) very fast growing economy, Ireland.

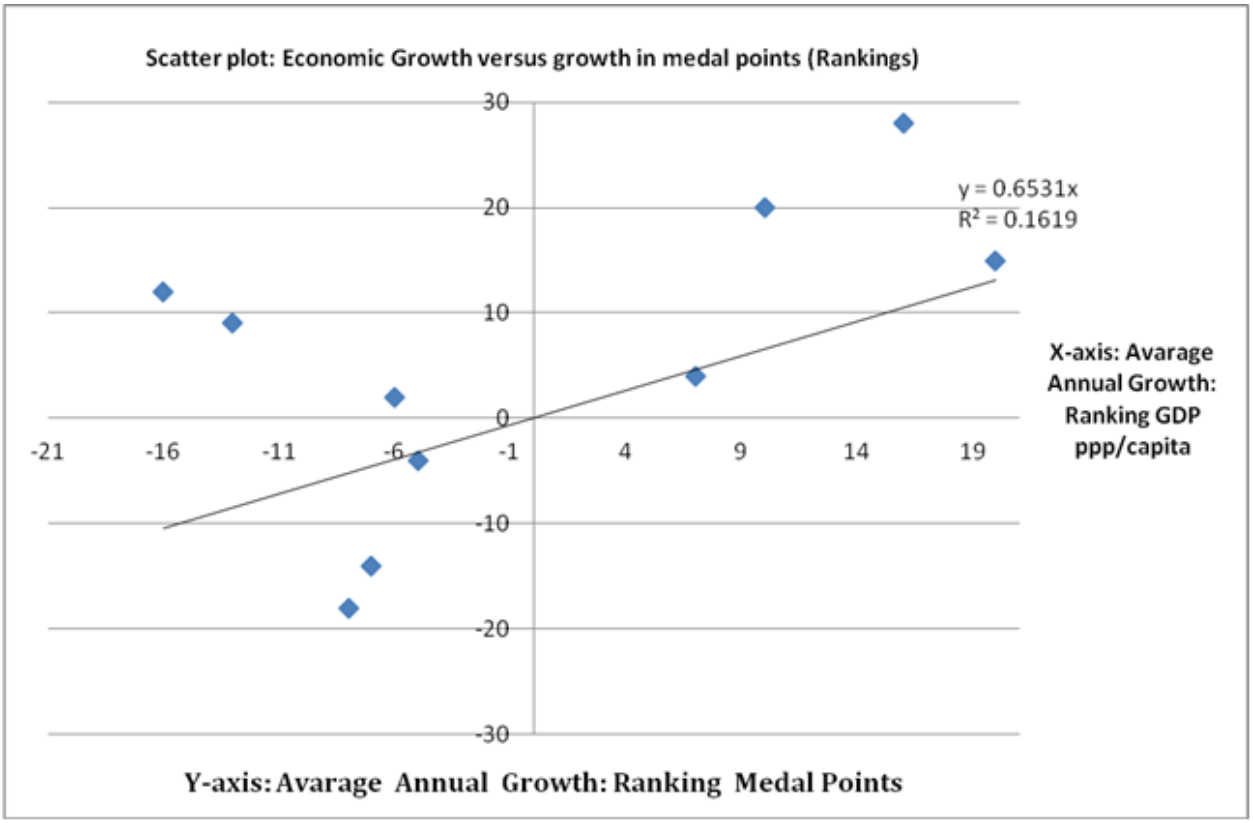
The next sections will discuss the reasons for the absence of a clear correlation between the independent and the dependent variable and accordingly the lack of evidence

confirming the hypothesis. The conclusion will also discuss the possible explanations for the varying country evidence.

However, first we will explore another overall correlation. The evidence presented above shows that most large (measured in total GDP) countries seems to experience mechanisms corresponding to the hypothesis. This is further documented in figure 2 below which shows, similar to figure 1, above/below average growth in GDP per capita on the horizontal axis and above/below average growth in medal points on the vertical axis. However, figure 2 only includes the ten largest countries (year 2000).

Interestingly, the figure shows a stronger correlation that the other calculations being made in this study although the finding must be tempered by the low number of observations in the figure.

**Figure 2: Annual growth in GDP versus annual growth in medal point (10 largest economies)**




**NB:** The table includes data from the ten countries with the largest GDP in 2009.

## Is there a link between economic growth and international sporting success?

Generally, the presented evidence does not support the hypothesis that above/below average growth in GDP per capita leads to relative improvement/deterioration of elite sport results (with a time lag). The only calculations that seem to indicate a possible but very weak link are those with long time lags (eight years). Figure 2 can be interpreted as evidence of the existence of a stronger link between economic growth and improvement in elite sport results than the other calculations indicate. In smaller countries there may be particular mechanisms in the sporting arena that explains the lack of correlation between the two variables, such as US scholarships to Jamaican sprinters, declining effect of

having hosted the Olympics in the past (Australia), increased international prize money available for Ethiopian and Kenyan distance runners, and so on. For large countries such particular mechanisms are less likely to influence the results and accordingly the evidence illustrated in Figure 2 is perhaps a more valid indicator than the calculations covering a large group of countries including a majority of small countries.

Does the fact that, generally, the hypothesis has not been confirmed by the findings mean that there is no link between the two variables? This is not necessarily the case. The inconclusive findings may reflect problems with operationalizing the dependent variable. Medal points at Olympic Games is a better measure than medal table rankings and total number of medals but it is still a weak indicator of the competitiveness of a country's elite sports system. Often small margins, and sometimes luck and chance, determine whether an athlete wins gold, silver or bronze or ends outside of the medals. In particular for countries with only a small number of medal points, the effect may be relatively big annual variations in the number of medal points which have no relation whatsoever to investments in elite sport development. In other words, the imperfections of the indicator for the dependent variable make strong correlations between the variables highly unlikely. Stronger correlations could be expected if measures such as top-8 points (8 points for no.1; 7 points for no. 2: …: 1 point for no.8) were used as an indicator. This measure would cancel out some of the contingencies that make medal points a weak indicator. Unfortunately, such data does not exist for longer periods.

Another problem is the focus on results in sports and disciplines on the programme of the Olympic Summer Games only. This ignores results in winter sports and non-Olympic sports, and it gives too much weight to minor individual Olympic sports compared to the

big team sports, e.g. weightlifting has more Olympic medals than all the Olympic team sports added together. Anyhow, there is no objective way of taking account of all the other indicators and results at the Olympic Summer Games is probably as good an indicator for international competitiveness of elite sports systems as it gets.

The inconclusive results may also be caused by the application of too short time lags. It may be that the impact of economic growth on investments in elite sport development and the subsequent improved results are processes that take much longer than eight years. Improvements of results are to a certain extent dependent on long lasting processes such as talent recruitment, talent development and the establishment of a well functioning, integrated national elite sport system. Conversely, below average economic growth may not have any negative impacts on funding in the short run, and none at all on an established elite sports system, and even if it has, the effects on results will probably be negligible because of the stock of competitive athletes with a proven track record and the effect of past investment in talent development.

Furthermore it is possible that the hypothesized link is actually wrong or very weak. It could be that investments in elite sports are determined by political choices that are independent from rates of economic growth. Affluent societies may provide more attractive alternatives to elite sport careers or divert interest into more commercialized forms of sport than the Olympic sports. Conversely, poorer societies may provide individuals with stronger incentives to work hard for success in elite sports as a means to escape poverty. In addition, increased funding is not automatically translated into improved performance. It is not only the input in terms of funds that determines the output measured by improved

performance. The output is also dependent on the 'throughput', i.e. the ways the systems works and the ways the funds are being used. Efficiency and proper targeting of efforts matter.

The fact that GDP is one of the factors that best explains the overall performance of countries in international sport competitions implies that there is probably some kind of link between economic growth and improved international competiveness of national elite sport systems. However, this study shows that the link is weak, at best long term, and contingent on a lot of factors including specific characteristics in each country. This is the level to which we now turn in order to identify explanations for divergent developments at the country level.

## Discussion of country specific evidence

In China high economic growth rates in the last three decades have been followed by a huge improvement of the country's competitiveness in international sports competitions. Its total number of medals at the Olympic Summer Games has increased from 32 and 28 in the two first Games after China re-entered the Olympic Games (1984 and 1988) to 63 and 100 in the two last Games (2004 and 2008). From a situation with strong competitiveness in a few sports (primarily table tennis, badminton, gymnastics and diving), China has now become a major powerhouse across the board. China is one of the most clear-cut examples of a country where economic growth leads to increased investment in elite sport development[4] and subsequently to international sporting success. However, this is not an

[4] Hong, *China*.

automatic process. The successful investment into building a high-performing elite sports system is a result of a strong political commitment codified by The Chinese Sport Ministry in 1985 as the 'Olympic Strategy' "aimed at using the nation's limited sports resources to develop elite sport to ensure that China would become a leading sports power by the end of the twentieth Century"[5]. This was further strengthened after 2001 when China won the right to host the 2008 Beijing Games. So, in the Chinese case economic growth has no doubt played a part but political commitment and the host effect are crucial intervening variables.

India is in one sense a complete opposite case. High economic growth has not had any effect on India's performance in international sports competitions such as the Olympic Games. Not until very recently, at least. The absence of the crucial intervening variables is possibly part of the explanation. There has been little political will to commit the necessary funds and to engage in long-term efforts to build systems, structures and capabilities. Furthermore, bureaucratic waste, centrifugal regional identities, and parochial sport managers only interested in politics and fringe benefits have diminished the returns of the limited investment and made the effort to improve elite sports in India inherently inefficient[6]. The increasing source of corporate sponsorship funds have been efficiently tapped by cricket in an almost monopolist fashion. In the early1980s, football and hockey were almost at level with cricket in terms of funds, participation and public attention. However, this changed radically during the 1980s with the expansion of television into a mass consumption good, which catapulted cricket into being, by some distance, the one

[5] Ibid, 33.
[6] Majumdar and Mehta, *India and the Olympics*.

and only dominant Indian sport[7]. The initiation of the Indian Premier League (IPL) in 2008 shows the enormous potential of corporate investment in sports in India. One indicator is the global sports salaries review showing that IPL in some respects is bigger than the English Premier League. IPL actually is the second highest-paid league, based on first-team salaries on a pro-rata basis, second only to the National Basketball Association (NBA) in the USA[8].

Interestingly, our findings show that India, together with China, is one of the countries where economic growth is most strongly correlated with improved elite sports competitiveness. This is highly dependent of the period chosen. It is only when the period for measuring the dependent variable is the most contemporary one that such a correlation exists. Had the period been an earlier one there would have been no correlation at all. This means that the finding, as far as the Indian case is concerned, is more unstable and more uncertain than the Chinese case. However, it may represent a new stage. There are strong indicators that Indian Olympics sports are growing in strength in recent years. The performance has significantly improved if measured by Top-8 points (see above) for all Olympic disciplines (figures from own data base).

The total has been 28 and 39 in the last two Olympic Games which is significantly higher than the average of 10 points in the Olympic Games in the period 1988-2000, and in 2009 and 2010 it has increased even more to 65 and 75. India is still only no. 35 in 2010 if all countries are ranked according to Top-8 points. However, its ranking is rapidly improving.

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[7] Ibid, 211-243.
[8] IPL 2nd highest-paid league, edges out EPL, http://timesofindia.indiatimes.com/iplarticleshow/5736736.cms.

Now, every year there are Indian athletes among the top-8 in world championships (or world cups in years without world championships) in the following Olympic disciples: archery, badminton, boxing, shooting and wrestling. Furthermore, in the Commonwealth Games in 2010, India produced medalists in almost all sports and ended second in the medal table.

There are many reasons for this new trend. The role of the Indian Army is one of them[9].Its 'Mission Olympics' includes recruiting young and talented sportsmen from around the country, giving them an Army rank without involving them in military work and training them for the Olympics[10]. The Army Sports Institute in Pune, which was created in 2001, has recently received increased funding. Foreign coaches have been brought in and the number of sportsmen trained has increased. Furthermore, the Army is building its own talent pool in special Boys Sports Companies across the country's regimental centres. In 2008, the total number of such sport cadets was close to 1000[11]. Olympic sports have also begun to tap into the huge potential corporate sponsorships. Success attracts media interest. Sponsorships follows and recent successes are attracting new funds, which may well create a virtuous circle of funding, investment in an elite sports system and better performance. Also, the investment effect of hosting the Commonwealth Wealth Games in 2010 may have contributed to the improved results.

In most other large countries, growth and sporting competitiveness correlate as in China and India. In the USA, growth in GDP per capita was above average in 1992-2000 and

[9] Majumdar and Mehta, India and the Olympic, 244-272
[10] Ibid, 245.
[11] Ibid, 245.

with an eight year time lags the growth in medal points was also above average. There may be a causal link mediated by corporate sponsorships which are crucial in the American elite sports model. In Britain there is a similar but stronger correlation. Economic growth was high in the 1990s which may have helped to improve the international competitiveness of British athletes. Recent experience in the UK shows a clear reverse link between decreasing growth rates and cuts in government support for sports. However, some of the factors mediating the link between growth and sporting performance are so significant that they would probably have resulted in improved relative competitiveness even if economic growth had been below average in the 1990s. For instance, from 1997, the incoming Labour Government gave higher priority to sports, including elite sports, and this would have had an effect independent of the economic growth figures in the 1990s. However, the most significant factor is the choice of London as the host of the 2012 Olympics, which resulted in an unprecedented political commitment to support elite sports. It is very likely that the subsequent support and investment would have resulted in improved British sporting competitiveness independent of growth figures in the 1990s. However, the growth in that period may have been one of the reasons why the Britain chose to bid for the Olympics in the first place.

France and Germany are among the group of countries with below average growth and correlating deterioration of its elite sports performance relative to other countries. In the Germany case, the correlation is much stronger than in the French case. This may reflect contingencies such as the decreasing effect of the German unification in the field of elite sports in 2000-2008. The effect of incorporating high-performance athletes trained in the

most efficient, if medically aided, elite sports factory in history diminished gradually which in itself will result in a decline in elite sports competitiveness.

The collapse of the Soviet Union and the communist regimes in Central and Eastern Europe and their elite sport systems had a momentous impact on the relative strength of national elite sport systems. Whereas in 1988, these countries won 51% of all Olympic medals (37% if GDR is excluded), the share of the same countries (including the 15 countries that were once the Soviet Union) had shrunken to 26% in 2000. As a result there have been far more medals for other countries. This had massive effects on the dependent variable which are totally independent of differences in (previous) economic growth rates.

Most former communist countries in Central and Eastern Europe experienced low economic growth or decline in the 1990s and decreasing sporting competitiveness in 2000-2008 in accordance with the hypothesis of such a link. Poland and Hungary are the exceptions with above average economic growth, but decreasing competitiveness in the elite sports field like the other countries. The different economic growth rates has to do with the particular modes of economic transition in different countries but these differences are of minor importance compared to the effects of the collapse of their high-performing elite sport systems of the past.

All four Nordic European countries (Denmark, Sweden, Norway and Finland) experienced above average economic growth in the 1990s but decreasing competitiveness of their elite sport systems in 2000-2008. This is contrary to the hypothesis. The fact that all countries experience similar developments indicates common reasons. One such reason may be

that in the 1990s these countries benefitted significantly from the collapse of the ‘state amateur’ systems in the 1990s which is reflected in significant improvements of their share of total number of medals. In the last decade there was a countervailing trend as an effect of the increased global competition including the emergence of China as a sporting superpower and the recovery of Russian sports. These trends in the elite sports field are unlinked with economic growth patterns.

There are other interesting cases of countries where growth and sporting performance do not develop in sync. Next to China and Ireland, South Korea had the highest economic growth in 1992-2000 among the countries covered in this study. However, their elite sport performance did not improve in the period 2000-2008. This has probably to do with the fact that although South Korean athletes were doing extraordinarily well around year 2000, probably as an effect of the same factors that caused the Nordic European countries to perform so well in this period, and possibly also as an effect of the diminishing returns of the huge investments in elite sports in connection with the Olympic Games in Seoul in 1988. Australia is a similar case. In this case it is quite obvious that the effects of the huge efforts to improve the competitiveness of Australian Olympic sports prior to the Olympic Games in Sydney has decreased during the last decade as other countries learn from the successful Australian Institute of Sport and catch up in other ways.

New Zealand is one of the countries who have learned most from the Australian success which together with a successful targeting of competitiveness in a few selected sports have resulted in significant improvement of results in spite of moderate below average economic growth. Japan has also improved its sporting competitiveness in 2000-2008 in

spite of a negative economic development in the 1990s. This reflects specific developments in the sporting field with no connection to economic growth. One such factor is the introduction in 2004 of female wrestling among the Olympic disciplines from 2004. This increased Japan's medal points in 2008 with 15 compared to 2000. Without this change in the program Japan would have been among the countries with below average growth in GDP per capita and below average percentage growth in medal points.

Finally, Brazil has also improved its sporting competitiveness in 2000-2008 in spite of a relative poor record of economic growth in the 1990s. In the last decade, however, the Brazilian economy has entered a period of very high economic growth rates. This has probably had positive effects on the investment in elite sports, even in the short term. Also, the investment effects of hosting the Pan American Games in 2007 have contributed to the recent improvement of the competitiveness of the Brazilian elite sports system.

## Conclusion

This study has tested a hypothesis assuming a direct causal link from economic growth to international sporting success. The evidence failed to provide evidence confirming the hypothesis. There is a case for arguing that there is some kind of link, anyway. The reasons why this has not been documented in this study may have to do with a failure to use the most appropriate time lag and an inappropriately specified indicator for the dependent variable.

However, the case evidence suggests that the link is at best indirect, and highly dependent on several intervening or mediating variables when such a link exists. The contrasting cases of China and India provide a good illustration of these mechanisms. In both countries, high rates of economic growth have provided a potential for increased investment in elite sports and improved elite sport results. However, sustained investments and improved competitiveness has only followed in China. Political commitment and state capacities have been crucial mediating variables in China. As a result of the lack of political commitment and managerial inefficiency these mediating variables have not been in place in India. It is quite possible that the direct effects of such seemingly mediating variables are so strong that they actually surpass the effects.

In the British case, the investment effect of having won the bid to host the Olympic Games can be seen as the most important variable mediating the documented link between economic growth and improved elite sport results. However, other cases indicate that the direct positive effect of hosting the Games, or even regional Games such as the Panamerican Games and the Commonwealth Games, on the competitiveness of the host

nation's athletes is much stronger that any potential negative effect of relatively low economic growth.

There are other third variables that probably have strong direct impacts on the dependent variable which may explain the lack of evidence for the hypothesis. For instance, the collapse of the communist regimes had strong and long-lasting effect on the elite sports competitiveness of nations, not only the former communist countries but all others as well. Internal developments in the field of (Olympic) sports may have important impacts on the dependent variable in itself as shown by the example of Japan where a seemingly minor addition of Olympic disciplines has a major impact on the evidence.

Finally, as evidenced by the New Zealand case, the direct effect of efficiency in the use of funds, including proper targeting of efforts, can be strong and stronger than the effect of economic growth.

This evidence is in accordance with a growing consensus among scholars that macro level factors are becoming less significant in relation to predictions of international sporting success:

> *"The principal reason for this view is that as nations become strategic in the way in which they produce elite athletes, they rely less on uncontrollable variables and more on variables which are widely regarded as being components of an elite sports development system"*[12].

[12] De Bosscher et al., The Global Sporting Arms Race.

These factors can be affected by elite sports policies, *i.e.*, politically initiated strategic programs aimed at improving the framework surrounding the elite athletes. Focal points at this level are the responsibilities and roles of different elite sports agencies, the administrative and managerial efforts of these agencies, the quality of training and the international competition opportunities, the level of provision and access to elite sport facilities, and so on[13].

In spite of the findings of this study, there is probably some link between economic growth and improved results. However, the case evidence indicates that it is indirect and dependent on strong mediating variables. Furthermore, the evidence shows that other third variables may have stronger effects on the dependent variables which may explain the lack of clear evidence for the tested hypothesis.

[13] De Bosscher, Sports policy factors leading to international sporting success. De Bosscher et al., The Global Sporting Arms Race.

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# APPENDIX

### Appendix 1: Medals points in Olympic disciplines 1996-2010 for selected countries

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **USA** | 366 | 238 | 307 | 276 | 326 | 265 | 316 | 283 | 351 | 393 | 336 | 365 | 366 | 320 | 326 |
| **Russia** | 225 | 258 | 264 | 279 | 300 | 315 | 313 | 285 | 292 | 287 | 297 | 291 | 236 | 241 | 281 |
| **China** | 170 | 258 | 206 | 192 | 218 | 211 | 233 | 205 | 239 | 242 | 312 | 310 | 354 | 315 | 319 |
| **Germany** | 208 | 245 | 234 | 234 | 168 | 233 | 203 | 221 | 153 | 160 | 180 | 204 | 140 | 197 | 144 |
| **Australien** | 118 | 157 | 147 | 176 | 189 | 156 | 154 | 139 | 165 | 176 | 158 | 153 | 149 | 120 | 118 |
| **France** | 126 | 179 | 165 | 151 | 129 | 116 | 108 | 111 | 108 | 153 | 112 | 135 | 119 | 124 | 132 |
| **Italy** | 119 | 160 | 100 | 89 | 115 | 95 | 88 | 74 | 105 | 97 | 115 | 107 | 87 | 101 | 109 |
| **Great Britain & NI** | 41 | 57 | 84 | 73 | 99 | 72 | 108 | 79 | 96 | 94 | 105 | 136 | 161 | 139 | 177 |
| **Hungary** | 67 | 77 | 92 | 59 | 64 | 80 | 89 | 74 | 64 | 68 | 71 | 72 | 34 | 69 | 62 |
| **Japan** | 43 | 58 | 56 | 94 | 59 | 65 | 87 | 105 | 131 | 97 | 98 | 77 | 83 | 82 | 145 |
| **South Korea** | 90 | 100 | 86 | 113 | 90 | 79 | 76 | 85 | 99 | 80 | 69 | 77 | 111 | 98 | 75 |
| **Cuba** | 85 | 107 | 80 | 96 | 102 | 119 | 104 | 67 | 88 | 98 | 70 | 57 | 65 | 63 | 66 |
| **Romania** | 59 | 71 | 83 | 88 | 89 | 93 | 54 | 40 | 67 | 48 | 26 | 26 | 29 | 33 | 31 |
| **Poland** | 60 | 47 | 55 | 62 | 51 | 67 | 59 | 54 | 31 | 50 | 65 | 58 | 35 | 55 | 38 |
| **Netherlands** | 53 | 41 | 62 | 69 | 95 | 64 | 33 | 37 | 70 | 100 | 80 | 84 | 58 | 61 | 48 |
| **Sweden** | 26 | 35 | 30 | 42 | 41 | 37 | 65 | 49 | 28 | 14 | 45 | 15 | 14 | 27 | 28 |
| **Ukraine** | 75 | 69 | 89 | 61 | 65 | 92 | 97 | 78 | 78 | 60 | 85 | 40 | 80 | 52 | 58 |
| **Spain** | 55 | 57 | 55 | 66 | 34 | 51 | 65 | 59 | 58 | 64 | 60 | 66 | 61 | 86 | 70 |
| **Bulgaria** | 46 | 33 | 36 | 38 | 47 | 33 | 56 | 40 | 31 | 28 | 25 | 32 | 14 | 12 | 20 |
| **Canada** | 64 | 43 | 37 | 69 | 40 | 29 | 26 | 55 | 39 | 44 | 41 | 36 | 54 | 38 | 53 |
| **Czech Republic** | 37 | 43 | 24 | 37 | 25 | 23 | 25 | 25 | 22 | 12 | 33 | 32 | 24 | 12 | 26 |
| **Brazil** | 42 | 33 | 44 | 32 | 30 | 36 | 32 | 31 | 37 | 51 | 47 | 47 | 43 | 38 | 44 |
| **Belarus** | 39 | 46 | 50 | 26 | 46 | 42 | 44 | 62 | 42 | 45 | 62 | 52 | 55 | 43 | 37 |
| **Kenya** | 23 | 25 | 46 | 19 | 23 | 26 | 46 | 15 | 21 | 19 | 42 | 44 | 50 | 39 | 71 |
| **Denmark** | 25 | 52 | 33 | 40 | 21 | 13 | 26 | 27 | 22 | 10 | 18 | 17 | 22 | 37 | 12 |
| **Turkey** | 25 | 39 | 39 | 39 | 19 | 37 | 40 | 5 | 32 | 14 | 17 | 15 | 23 | 30 | 33 |
| **New Zealand** | 23 | 28 | 33 | 28 | 11 | 14 | 17 | 16 | 21 | 29 | 31 | 35 | 29 | 42 | 45 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Finland** | 13 | 27 | 19 | 18 | 15 | 14 | 9 | 8 | 6 | 6 | 6 | 16 | 12 | 9 | 7 |
| **Switzerland** | 29 | 16 | 15 | 35 | 27 | 23 | 19 | 13 | 14 | 25 | 16 | 26 | 21 | 20 | 18 |
| **Norway** | 22 | 26 | 16 | 12 | 35 | 28 | 35 | 13 | 27 | 18 | 22 | 10 | 32 | 20 | 18 |
| **Greece** | 32 | 8 | 25 | 48 | 44 | 39 | 36 | 32 | 56 | 11 | 21 | 11 | 10 | 13 | 23 |
| **Belgium** | 20 | 12 | 25 | 12 | 12 | 21 | 12 | 12 | 9 | 12 | 18 | 134 | 8 | 4 | 9 |
| **Iran** | 10 | 17 | 27 | 17 | 17 | 30 | 36 | 18 | 20 | 33 | 30 | 20 | 7 | 28 | 30 |
| **Jamaica** | 18 | 17 | 14 | 13 | 18 | 15 | 11 | 13 | 18 | 24 | 26 | 29 | 43 | 51 | 35 |
| **Kazakhstan** | 35 | 21 | 24 | 25 | 27 | 12 | 7 | 16 | 23 | 21 | 28 | 16 | 36 | 37 | 31 |
| **Ethiopia** | 12 | 5 | 10 | 16 | 29 | 24 | 8 | 25 | 23 | 31 | 22 | 18 | 27 | 24 | 13 |
| **Yugoslavia** | 12 | 14 | 15 | 7 | 10 | 10 | 10 | | | | | | | | |
| **Slovak Republic** | 10 | 9 | 38 | 22 | 16 | 19 | 28 | 21 | 20 | 19 | 12 | 20 | 23 | 19 | 26 |
| **Mexico** | 2 | 16 | 12 | 14 | 17 | 20 | 13 | 15 | 11 | 2 | 7 | 3 | 12 | 15 | 17 |
| **Argentina** | 7 | 9 | 4 | 5 | 10 | 25 | 22 | 12 | 18 | 17 | 15 | 8 | 18 | 13 | 5 |
| **Austria** | 7 | 20 | 4 | 10 | 13 | 21 | 6 | 12 | 24 | 15 | 7 | 9 | 7 | 5 | 9 |
| **North Korea** | 17 | 10 | 7 | 12 | 9 | 8 | 18 | 8 | 14 | 7 | 7 | 29 | 19 | 10 | 9 |
| **South Africa** | 20 | 13 | 0 | 31 | 12 | 12 | 12 | 17 | 18 | 15 | 10 | | 3 | 15 | 3 |
| **Uzbekistan** | 5 | 8 | 5 | 23 | 12 | 26 | 14 | 22 | 17 | 15 | 12 | 9 | 17 | 31 | 29 |
| **Azerbaijan** | 3 | 2 | 13 | 2 | 12 | 22 | 19 | 16 | 13 | 18 | 13 | 10 | 19 | 40 | 28 |
| **Taipeh** | 3 | 27 | 32 | 31 | 11 | 26 | 20 | 7 | 18 | 5 | 2 | 10 | 8 | 2 | 7 |
| **Georgia** | 4 | 12 | 4 | 9 | 12 | 15 | 19 | 17 | 16 | 12 | 14 | 22 | 21 | 14 | 4 |
| **Indonesia** | 12 | 21 | 10 | 6 | 18 | 10 | 6 | 3 | 12 | 15 | 3 | 15 | 14 | 10 | 5 |
| **Morocco** | 4 | 15 | 11 | 20 | 11 | 13 | 8 | 13 | 13 | 14 | 3 | 5 | 5 | 0 | 10 |
| **Croatia** | 8 | 4 | 7 | 2 | 7 | 7 | 9 | 21 | 15 | 13 | 7 | 15 | 12 | 19 | 23 |
| **Slovenia** | 6 | 0 | 5 | 9 | 10 | 10 | 18 | 9 | 9 | 22 | 10 | 18 | 15 | 15 | 4 |
| **Lithuania** | 2 | 7 | 10 | 11 | 16 | 13 | 5 | 10 | 11 | 7 | 12 | 9 | 12 | 9 | 16 |
| **Thailand** | 7 | 0 | 3 | 2 | 9 | 0 | 10 | 12 | 26 | 16 | 13 | 17 | 16 | 3 | 6 |
| **Portugal** | 7 | 23 | 8 | 2 | 4 | 5 | 0 | 7 | 8 | 6 | 8 | 13 | 8 | 9 | 8 |
| **Mongolia** | 2 | 6 | 15 | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 4 | 6 | 16 | 18 | 14 |
| **Ireland** | 17 | 4 | 9 | 0 | 3 | 4 | 9 | 8 | 0 | 3 | 2 | 3 | 7 | 5 | 5 |
| **Estonia** | 0 | 0 | 2 | 3 | 9 | 9 | 8 | 5 | 7 | 13 | 18 | 11 | 8 | 4 | 10 |
| **India** | 2 | 0 | 3 | 5 | 2 | 2 | 0 | 9 | 3 | 3 | 12 | 0 | 9 | 7 | 21 |
| **Serbia** | | | | | | | | 9 | 6 | 8 | 10 | 12 | 9 | 25 | 25 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Armenia** | 8 | 10 | 10 | 0 | 2 | 14 | 7 | 0 | 0 | 2 | 8 | 5 | 12 | 8 | 17 |
| **Nigeria** | 19 | 3 | 12 | 11 | 15 | 2 | 0 | 0 | 4 | 3 | 0 | 0 | 9 | 0 | 0 |
| **Bahrain** | 3 | 2 | 3 | 5 | 8 | 11 | 13 | 2 | 7 | 8 | 0 | 11 | 5 | 5 | 0 |

**Note:** Total medal points (gold: five points, silver: three points, bronze: two points) in all disciplines at the Olympic Summer Games are calculated for each country for all years in the period 1996-2010. In years in-between the Olympics, results in all the Olympic disciplines from similar competitions (world championships, world cups or alternatively world rankings) are included. The results in such years are adapted to the conditions prevailing in the Olympic Games, e.g. same number of bronze medals per discipline and same maximum number of entries per nation in each discipline. The results are calculated in such a way that they come as close as possible to represent a situation 'as (it would have been) if' there were Olympic Games each year. In years in-between Olympic Games results are included from all disciplines on the programme at the subsequent Games. The countries included in the table are the 60 largest countries among the countries winning medals in the period (plus Yugoslavia and Serbia).

**Appendix 2: Average annual growth in GDP per capita (1992-2000) and medal points in Olympic disciplines (2000-2010) for selected countries**

| Country | Annual Average Growth GDP 1992-2000 (%) | Rank | Annual Average Growth Top five points 2000-2008 (%) | Rank |
|---|---|---|---|---|
| **Argentina** | 3,27 | -9 | -1,39 | -7 |
| **Armenia** | - | | 5,33 | 14 |
| **Australia** | 4,62 | 9 | -2,02 | -10 |
| **Austria** | 4,04 | 0 | -4,62 | -19 |
| **Azerbaijan** | - | | 6,20 | 18 |
| **Bahrain** | 3,12 | -11 | -7,74 | -24 |
| **Belarus** | - | | 2,27 | 7 |
| **Belgium** | 4,16 | 1 | 9,78 | 22 |
| **Brazil** | 2,99 | -13 | 2,92 | 9 |
| **Bulgaria** | 0,12 | -22 | -8,52 | -25 |
| **Canada** | 4,27 | 5 | 1,25 | 3 |
| **China** | 10,93 | 20 | 5,36 | 15 |
| **Croatia** | - | | 11,42 | 24 |
| **Cuba** | - | | -5,41 | -22 |
| **Czech Republic** | - | | -0,67 | -2 |
| **Denmark** | 4,18 | 2 | -2,80 | -16 |
| **Estonia** | - | | 6,42 | 19 |
| **Ethiopia** | 3,23 | -10 | 2,26 | 6 |
| **Finland** | 4,90 | 14 | -4,94 | -21 |
| **France** | 3,64 | -5 | -0,91 | -4 |
| **Georgia** | - | | 3,04 | 11 |
| **Germany** | 3,42 | -7 | -2,65 | -14 |
| **Great Britain & NI** | 4,66 | 10 | 6,43 | 20 |
| **Greece** | 3,87 | -2 | -10,65 | -27 |
| **Hungary** | 4,67 | 11 | -2,72 | -15 |
| **India** | 6,05 | 16 | 19,23 | 28 |
| **Indonesia** | 3,78 | -3 | -0,77 | -3 |
| **Ireland** | 8,88 | 19 | -1,59 | -8 |
| **Iran** | 4,23 | 3 | -1,23 | -6 |
| **Italy** | 3,52 | -6 | 0,80 | 2 |

| | | | | |
|---|---|---|---|---|
| **Jamaica** | 1,23 | -21 | 12,64 | 26 |
| **Japan** | 2,59 | -16 | 3,76 | 12 |
| **Kazakhstan** | - | | 5,70 | 17 |
| **Kenya** | 1,75 | -20 | 5,52 | 16 |
| **Lithuania** | - | | 0,67 | 1 |
| **Mexico** | 3,29 | -8 | -4,18 | -18 |
| **Mongolia** | 2,52 | -17 | 18,42 | 27 |
| **Morocco** | 3,02 | -12 | -11,83 | -28 |
| **Netherlands** | 4,48 | 8 | 0,31 | 0 |
| **Nigeria** | 2,08 | -19 | -17,01 | -31 |
| **North Korea** | | | 4.02 | 13 |
| **Norway** | 5,08 | 15 | -2,61 | -13 |
| **New Zealand** | 3,98 | -1 | 7,38 | 21 |
| **Poland** | 6,73 | 17 | -1,96 | -9 |
| **Portugal** | 4,73 | 12 | 11,69 | 25 |
| **Romania** | 2,65 | -14 | -12,10 | -29 |
| **Russia** | - | | -1,10 | -5 |
| **Slovak Republic** | - | | -2.55 | -12 |
| **Slovenia** | | | 2.22 | 5 |
| **South Africa** | 2,47 | -18 | -9,18 | -26 |
| **South Korea** | 6,96 | 18 | -0,40 | -1 |
| **Spain** | 4,76 | 13 | 2,99 | 10 |
| **Switzerland** | 2,60 | -15 | -2,03 | -11 |
| **Sweden** | 4,29 | 6 | -6,19 | -23 |
| **Taipeh** | | | -16.26 | -30 |
| **Thailand** | 4,25 | 4 | 10,92 | 23 |
| **Turkey** | 3,66 | -4 | -4,74 | -20 |
| **Ukraine** | | | -3.06 | -17 |
| **United States** | 4,29 | 7 | 1,76 | 4 |
| **Uzbekistan** | | | 2.57 | 8 |

**NB:** The countries included are the 60 largest countries among the countries winning medals in the period. Yugoslavia and Serbia are not included.