The Contest for Olympic Succes as a Public Good

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Abstract

This study considers the performance of countries at the Olympic Games as a public good. Firstly, it is argued that, at the national level, Olympic success (measured as the number of gold medals won) meets the two key conditions of a public good: non-rivalry and non-excludability. Secondly, it is demonstrated that standard income inequality measures, such as the Lorenz curve and the Gini index, can be successfully applied to the distribution of Olympic success. The actual distribution of Olympic success is compared with alternative hypothetical distributions, among which according to population shares, the distribution favoured by a social planner and the noncooperating Nash-Cournot distribution. By way of conclusion, a device is proposed to make the distribution of Olympic success more equitable.

1. Introduction

At the Summer Olympics Games 2004 in Athens, more than eleven thousand athletes from over 200 countries competed for medals in 301 different sport events. More than half (56%) of all medals, and 60% of all gold medals, were collected by the Top 10

countries, which comprise one third of the world population.[1] Only one in four participating countries succeeded in winning at least one gold medal, whilst 63% of the participating countries failed to win any medals.

In this contribution I will consider Olympic success (OS) as a public good at the country level, but as a rival good between countries. The celebration of OS is essentially a public good, because the pleasure created by an athlete winning gold is truly a non-excludable and non-rival good. The enjoyment of one passive spectator seeing his fellow country(wo)man win a medal does not exclude the enjoyment of another spectator from the same country. Nor is it possible to exclude some citizens from passively sharing in the success of its country. Since it is non-excludable, private markets may not generate the optimal amount of OS.

The distribution of OS is also a fixed sum game. By definition, the number of different events is limited and fixed *ex ante*, and per event only three medals can be assigned. Therefore, any country trying to or succeeding in getting a larger share in the medal count imposes a negative externality on all other competing countries. The former socialist countries have shown that, in a sense, OS can be manufactured (see also Hoffman et al. 2002 and 2004). At the Olympic Summer Games of Seoul 1988, just prior to the fall of the Wall in 1989, the People's Republic of Germany DDR with only 17 million inhabitants won more gold medals than the USA with a population of nearly 250 million. Although doping definitely played a role, these countries have shown that a coordinated sport policy can breed OS. In other words, there is no such thing as a natural distribution of OS. The present distribution is strongly biased towards the rich countries and some countries which attach a high political preference

[1] Exclusion of China from the top 10 gives that the other 9 countries, with a world population share of only 14%, capture half of all gold medals. For the Olympics 2000, the top ten had a gold share of 66% against a population share of 33%. In 1996 it was 65% against 34%, in 1992 78% against 34%, in 1988 81% against 14%.

for OS. To an increasing extent, countries embark in a rat race to compete for OS by means of government expenditures exclusively allocated to stimulate professional sport.

In what follows, the actual distribution of OS will be compared with the distribution according to population shares, according to world GDP-shares, the Nash-distribution and the welfare optimal distribution. At the end, a device is proposed to make the distribution of OS more equitable.

2. Lorenz curves

For simplicity, it is assumed that all disciplines are equally important – so, a gold medal in obscure sports as fencing, archery or skeet shooting is as important as one in track and field – and only the distribution of gold medals is considered. In Table 1, the countries are ranked in descending order according to population shares (column 2). Income per capita is given in column 3. Column 4 gives the actual gold medal tally of Athens 2004 and column 5 the gold medal share. If gold medals were distributed in proportion to population shares, as in column 6, then China receives twice as much as its actual share now, India would win 50 gold medals, whilst the USA only retains 14 gold medals. Comparing columns 4 and 6, it is mainly the rich countries (USA, Germany, UK, France, Italy and Japan) which capture a much larger share of medals than would follow if medals were distributed according to population shares.

These distributions can be nicely illustrated by means of a Lorenz curve. In Figure 1, countries are ranked according to the ratio of medal share and population share, the horizontal axis registers the cumulative share of the world population, while the vertical axis registers the cumulative share in the world gold medal score. Almost all the rich countries, along with Russia, are located at the far right, whereas almost all

Third World countries, including China, are located at the left. 44 percent of the world population does not win a gold medal. The proportional distribution, represented by the 45º line and column 5 of Table 1, obtains when every world citizen has the same chance of OS, irrespective of political regime, income per capita, race or religion.

In Figure 2, the cumulative world income share is on the horizontal axis and countries are ranked according to the ratio of world share in gold medals and share in world income. The USA now shifts to the left: its GDP accounts for more than 20 percent of world output, against a gold medal share of only 11.6 percent. Interestingly, comparing both figures reveals that OS is much more equally distributed if pitched against cumulative world income shares rather than cumulative population shares. The Gini-index for the former is 52.7 percent, against 74.7 percent for the latter. This is in line with the finding of Bernard and Busse (2004) that GDP has more explanatory power for OS than population size.

3. The Nash distribution

When each country follows a Nash-Cournot strategy for OS, it will try to maximize the utility of a representative citizen, knowing that other countries will follow the same strategy. Utility has two arguments, income per capita and the amount of OS as measured by the medal score. Moreover it is assumed that the medal share of a country is proportional to its share in investment in OS worldwide.

The Nash-equilibrium distribution will be determined by two counteracting forces. On the one hand, the predominant populous but poor countries will breed many athletes of Olympic calibre because the costs can be divided over the entire population, so the costs per athlete per citizen are small. On the other hand, countries with a high per capita income – and so a low marginal utility of per capita income –

will invest more in OS because the welfare cost are small.[2] The resulting Nash-distribution is strongly dependent on the parameter values chosen. The final column in Table 1 gives the Nash-equilibrium distribution under the following assumptions: (i) utility is additively separable in income per capita and OS; (ii) marginal utility of per capita income is inversely related to per capita income; (iii) marginal utility of OS is inversely related to the square root of the medal score of the country and (iv) the size of the population is of no relevance for the number of talents (as the DDR has shown, the bottleneck is not so much the availability of enough talent, but the means to raise talents to top athletes). The medal score of a country is then determined by its GDP-share – where GDP equals income per capita times population size – and the degree in which the marginal utility of OS declines. On top of the medal tally is the USA with a predicted medal score of 29, followed by China (22), Japan (18), India (15), Germany (11) and UK (8). Note that the Nash distribution, with the notable exceptions India and Russia, is reasonably close to the actual distribution.

4. The welfare optimal distribution

A hypothetical social planner maximizing world welfare will try to assign different fields of sport to different countries, e.g. based on comparative advantages.[3] Sport events of say swimming are assigned to Australia, track and field to USA, weight lifting to East European countries and long distance running to African countries. In the limit, this boils down to making the cost functions zero. The optimum condition is that the marginal contribution of OS to world welfare must be equalized across

[2] For instance, the welfare cost of about €80 million spend by The Netherlands, a quarter of the entire governmental sport budget, for the present Olympic cycle up to Beijing 2008 to realize its ambition of a place among the top 10, is much smaller than when say Cameroon would spend the same amount.

[3] Tscha and Pershin (2003) apply the analysis of comparative advantages in international trade theory to the country's performances in each sport, e.g. countries with a long coastline are expected to have a comparative advantage in sailing or rich countries have a comparative advantage in the expensive equestrian sport events.

countries. As expected, the more populous countries will get more medals, but due to the declining marginal utility of OS there comes a point at which a medal to a small country delivers more welfare than even more medals to the large country. If the marginal utility of OS is inversely proportional to the medal score, then the distribution according to population shares, given in column 5 of Table 1, is welfare optimal. It is important to note that this distribution also results when Olympic talent is distributed at random around the world or proportional to population shares and all have the same facilities and willingness to develop their talents.

5 The auction of entry tickets

Admittedly, the idea of a social planner implicitly or explicitly assigning medals, based on alleged comparative advantages, to countries is rather awkward. However, the IOC, embodied with supranational authorities, is capable of regulating international sport affairs in a more equitable way. As a thought experiment, the proposed policy is to auction the limited number of entries available at the Olympics. As noted in the introduction, approximately eleven thousand athletes participated in the last Games. Suppose the IOC distributed these eleven thousand entries according to population shares: thus China would receive approximately 2266 entry rights, India 1859, USA 506 and Germany 143, and so on. India, with few calibre athletes, would be willing to sell a large share of their entry rights at the auction, whereas USA and Germany would be eager to buy additional entry rights. If the auction works well, a uniform equilibrium price will result. India, and other countries with a relatively low sport profile, would earn revenues, paid for by countries with a relatively high sport profile. Recall the Lorenz curve drawn in Figure 1: the more a country is situated at

the far left (like India and many other poor countries), the more it benefits from such a scheme, while the more a country is situated at the far right (like Norway, Australia and almost all other rich countries, as well as some former socialist countries), the more it is a net contributor to the scheme.

The IOC and NOCs have to monitor that the earmarked revenues derived from the auction are really used to improve the sporting infrastructure of the benefiting countries. If such a system works properly, the resulting medal tally would oscillate in between medal tallies we have seen above: the one biased towards the rich countries, like the actual medal tally and the Nash equilibrium medal tally, and the other one biased towards the poor countries, like the medal tally proportional to population shares or the welfare optimal distribution. The ensuing revenues allocated to sport facilities in poor countries will remove the major obstacle - money to buy sport equipment and top sporting knowledge on the market - why these countries perform relatively under the mark at the Olympics. In the end, poor countries would be equally capable of breeding calibre athletes as rich countries, in which case few countries would have to buy or sell entries at the auction. The parade of athletes in the stadium at the opening ceremony would be a true reflection of the world population.

Of course, there are some downsides to this proposal. The revenues of the auction will distort the allocation of resources at the national level as these revenues may partly or fully replace the national sport budget. In any case, since these countries are poor, the ‘deadweight’ costs will be minor, if not negative. Second, and more seriously, the scheme could have the result that not the very best worldwide athletes enter the pitch at the Olympics. The present qualification regime, with pre-Olympic tournaments in which qualification tickets (entries) to the Olympics can be won, is exactly geared towards mobilizing a prefixed number of the very best to the Games

and the resulting distribution is to be preferred above one resulting from a more equitable representation of the world population or one which maximizes a highly hypothetical measure of world welfare. Under the auction scheme, it might be expected that rich countries, since marginal utility of per capita income is much lower, would be more eager to take the bet, buy an additional entry at the auction, and send an athlete with only a small medal-winning chance. True, but this would be a temporary phenomenon, because sooner or later the sports investments, financed by the revenues of the auction, will bear fruit. Moreover, since many Olympic disciplines are capital intensive, there is already a huge built-in bias in favour of the predominantly rich countries that can afford the necessary expenditures and infrastructure to nourish these sports (such as equestrian sports, yachting, sailing). Cross-subsidization counteracts this bias.

Third, one may be inclined to think that OS is a good that is not for sale. This argument would have a bite if *medals*, not *entries*, would be for sale. An entry is no guarantee for a medal, only a license to compete for the medal. My estimate is that even the poorest country in the world will send athletes with a real chance of winning a medal to the Games, even if they have to forego the revenues of selling the entry ticket at the auction.

Fourth, rich countries pay the lion share of the revenues of the Olympics in terms of broadcast fees. Since they are paying more, they are also entitled to capture a larger share of OS. This argument is a non-starter. As soon as other countries become more successful, their home markets will also be prepared to pay more to broadcast the Olympics. Moreover, it goes strongly against the idea of the Olympics, the unity and brotherhood of mankind.

To conclude, it might be feasible to combine the best of both systems. The present pre-Olympic qualification tournament system can be made less strict, with the result that say twice as much qualification tickets are issued than entries available at the final Olympics. Rich countries with a disproportional high ratio of qualification tickets and entry tickets can only effectuate the former by buying additional entry tickets from the countries with a disproportional low ratio of qualification and entry tickets. Such a system, or alternative redistributive systems, avoids the practice that the Olympics is predominantly a play for the rich and some other countries that use the event for other purposes.

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Table 1. Four different distributions of Olympic success.

1	*2*	*3*	*4*	*5*	*6*	*7*	*9*
	p	y^c	***M***	***m***	M_p	M_y	M_N
Country	***Pop share***	***y per capita***	***Medals***	***Medal share***	***Medals***	***Medals***	***Nash***
China	20,7%	6,2	32	10,6%	62,2	41,2	21,9
India	16,9%	3,4	0	0,0%	50,9	18,5	12,8
United States	4,7%	41,8	35	11,6%	14,0	62,6	28,9
Indonesia	3,4%	3,7	1	0,3%	10,3	4,1	4,7
Brazil	2,8%	8,5	5	1,7%	8,5	7,7	7,2
Pakistan	2,3%	2,4	0	0,0%	7,0	1,8	2,7
Russia	2,3%	10,7	27	9,0%	7,0	8,0	7,3
Bangladesh	2,2%	2,1	0	0,0%	6,6	1,5	2,4
Nigeria	2,1%	1,0	0	0,0%	6,5	0,7	1,4
Japan	2,1%	30,4	16	5,3%	6,2	20,1	13,6
Mexico	1,6%	10,0	0	0,0%	4,9	5,2	5,5
Germany	1,3%	29,7	14	4,7%	4,0	12,7	10,0
Vietnam	1,3%	3,0	0	0,0%	3,9	1,3	2,1
Philippines	1,3%	5,1	0	0,0%	3,9	2,1	3,0
Turkey	1,1%	7,9	3	1,0%	3,4	2,9	3,7
Ethiopia	1,1%	0,8	2	0,7%	3,3	0,3	0,8
Egypt	1,1%	4,4	1	0,3%	3,2	1,5	2,4
Iran	1,1%	8,1	2	0,7%	3,2	2,8	3,6
Thailand	1,0%	8,3	3	1,0%	3,0	2,7	3,5
France	1,0%	29,9	11	3,7%	2,9	9,2	8,1
United Kingdom	1,0%	30,9	9	3,0%	2,9	9,5	8,2
Italy	0,9%	28,3	10	3,3%	2,8	8,5	7,6
Congo (DR)	0,8%	0,8	0	0,0%	2,5	0,2	0,7
Burma	0,8%	1,8	0	0,0%	2,4	0,5	1,1
Ukraine	0,8%	6,8	9	3,0%	2,4	1,7	2,6
Other countries	24,3%		121	40,2%	73,2	73,8	134,9

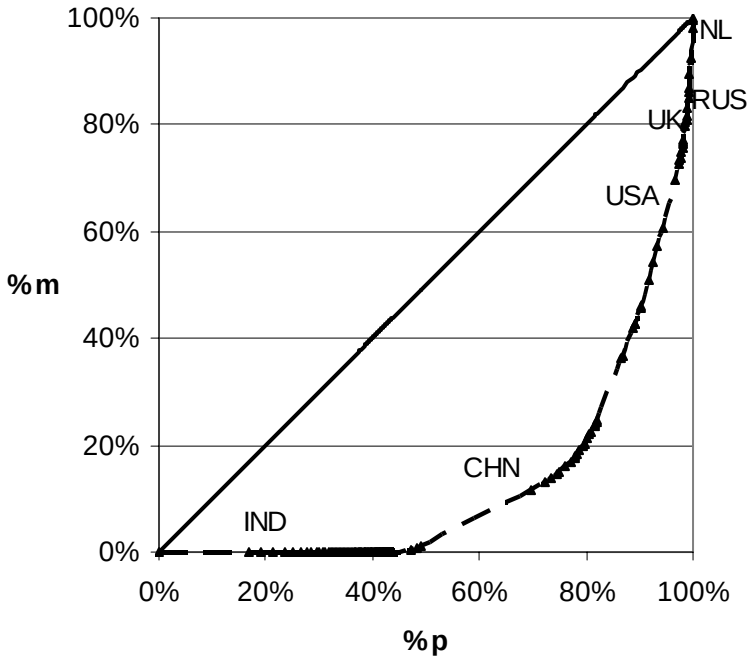

Figure 1. Cumulative gold medal share (%m) versus cumulative population share (%p), countries ranked by m/p.

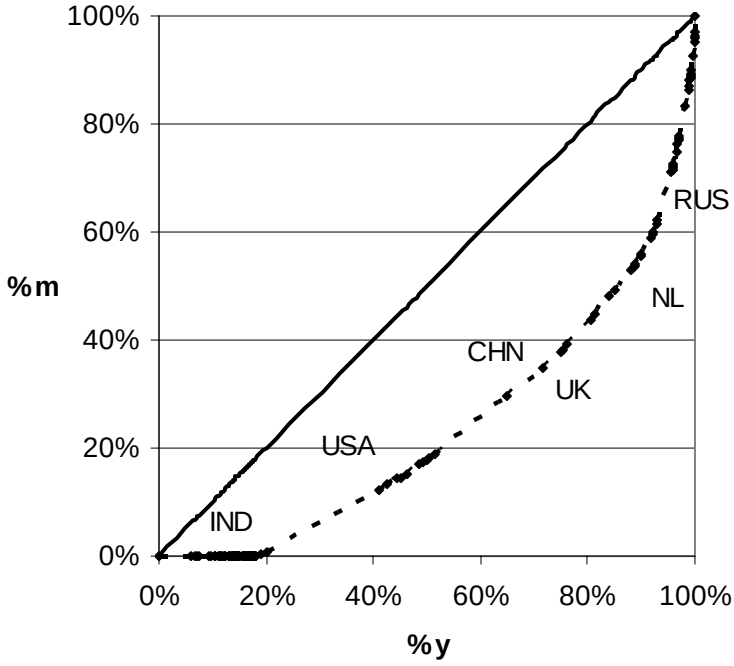

Figure 2. Cumulative gold medal share (%m) versus cumulative world GDP share (%y), countries ranked by m/y.