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Economic evaluation of the Olympic Games

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ABSTRACT

The purpose of this paper and study i.e. to figure which key economic factors can help us explain country performance (medals) in the Olympics. The paper focuses on 3 key objectives, namely: To produce a list of possible key economic factors that can explain Olympic performance. To produce a simple Mathematical model based on these factors which could possibly predict the Olympic tally at a country level. To identify the degree to which these factors will influence Olympic performance the study has been carried out in a way to develop a conceptual model and to analyze the hypotheses. I have considered the Beijing Olympics 2008 Games, sampled with 83 countries and 946 medals for the study. Based on the findings of the study, a few recommendations have been made, which if implemented in developing countries like India, may contribute to improving the sport performance of these countries in the future.

Keywords— Olympic Games, Demographic

1. INTRODUCTORY SUMMARY

As a keen sportsperson and a student of Economics, I have been driven by two motivators as I embarked upon the journey to write this research paper. Firstly, why does India with a population of over 1.3 billion people fare so poorly in terms of total medal count at the Olympic Games. A corollary to the question then becomes what are the key factors that can possibly explain a country's success (medals won) or the lack of it at the Olympic Games.

Economics in its truest form is both an art and a science and my effort will be to marry these two aspects as I try and examine the factors which lead to Olympic success at a country level. The study is set in context of the Olympic Games held in Beijing in 2008, and one of the key questions this paper seeks to try and answer is whether our chosen set of economic variables have the capability to explain and predict Country performance at the Olympic Games.

At one level it seems absurd to even think that Economic parameters can influence success or failure which seem to be determined by an athlete's individual skills, mental strength and determination along with the hunger to win, which in turn drives the performance of incredible feats and world records that make Olympic legends.

There is some amount of available research around key factors at a country level which could possibly explain success at the Olympic Games. The factors range from Size of Population, GDP, GDP per Capita, Human Development Index, Roads per Capita, School Enrollment, % of Rural population.

Factors like total size of a country's population are easy to discredit as a predictor to Olympic medals based on a cursory study of data. If one were to hypothesize that China's success at the Beijing Olympics is because of its enormous population then the Olympic performance of the next most populous country i.e. India quickly disproves the hypothesis. At the Beijing Olympics 2008, India won one gold medal compared to China's 51 and 3 medals overall compared with China's 100. Between India and China, there were 51 countries, including Cuba with a population of 11.3 million people who won 24 medals. (India's population is 104 times population of Cuba). So, population does not seem to be a key variable successfully explaining success.

There is also a fair amount of debate around the host country having a higher chance of winning medals at the game. There is no doubt that in today's world hosting the Olympic Games is a huge international event attracting global media presence. A mega global media presence, is one of several strategies used by countries for image enhancement on a global platform. Hosting an Olympic event would certainly help promote tourism and be a driver to GDP growth. It can also highlight how accessible the host country is to potential businesses. The crowds at the host country can possibly motivate in-country athletic performance and also impact referring decisions.

The positive Economic impact of hosting the game is easier to follow i.e. government spending on constructing Olympic sites and improving the infrastructure typically leads to real appreciation of the host country's currency, as the country sees an influx of

visitors during the actual games. Not only does the currency appreciate, but hosting an Olympic Games could also have an impact on the stock markets. If markets were forward-looking, we would expect the benefits of the Olympics to be priced into local equity markets at the time of the announcement, since the approximate magnitude of required investment would be known in advance. Is it plausible that the host country also ends of winning more medals? Maybe. I have treated this as one of the variables in this study.

The purpose of this paper and study is to figure which key economic factors can help us explain country performance (medals) in the Olympics. The paper focuses on 3 key objectives, namely:

- To produce a list of possible key economic factors that can explain performance.
- To produce a simple Mathematical model based on these factors which could possibly predict the Olympic tally at a country level.
- To identify the degree to which these factors will influence Olympic performance.

The study has been carried out in a way to develop a conceptual model and to analyze the hypotheses. I have considered the Beijing Olympic Games 2008, sampled with 83 countries and 946 medals for the study.

Based on the findings of the study, a few recommendations have been made, which if implemented in developing countries like India, may contribute to improve the sports performance of these countries in future.

2. MATERIALS AND METHODS

For the purpose of this study, I have had to depend on the secondary data and to some extent the availability of data has determined the variables and methodology used in the study. Although it would have been useful to evaluate the impact of the chosen economic variables on Olympic performance across a number of games, I have had to restrict myself to one Olympic Game i.e. the Beijing Olympics 2008. Furthermore, samples taken represents nations who had won at least one medal at the games, and by excluding 3 countries for which no data was available.

There is one dependent variable namely Count of Medals won (M_x) and five independent variables namely, GDP per capita, Human Development Index (HDI), whether the host city or not, School enrollment, primary (% net) and Rural population (% of total population) were included in the study.

Furthermore, the processing of the data pertaining to the Medal count was handled thoughtfully. The validity of data was maintained by assigning weights of 0.5, 0.3 and 0.2 for a Gold, Silver and Bronze medals respectively. On this basis, I calculated the weighted total for each country and prepared a weighted medal tally for the 2008 Beijing Olympic Games.

Data relating to the GDP per capita (current US\$) was used as available on the World Bank Website (World Development Indicators). GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data used is in current U.S. dollars. Bearing in mind the social development as one of the factors being represented by Human Development Index (HDI), the data has been taken from the Human Development Report 2016. Further, for School enrollment, primary (% net) and Rural population (% of total population), again the data has been taken directly from the World Development Indicators section of the World Bank reports. If the country is hosting the Olympic game, then it is marked as 1, else 0.

In the research paper, I have used the inferential statistical tools such as R square and correlation coefficient to present and analyze the data. Their explanation stands as:

2.1 R Square

A statistical measure of how close the data are to the fitted regression line. In other words, it is the percentage of the response variable variation that is explained by a linear model.

2.2 Coefficient of correlation

A measure that determines the degree to which two variable's movements is associated.

Understanding the complexity in studying the complete data set, I have restricted the study by taking a sample of 83 countries with the medal count total as 946. While I would have liked to use a wider sample across years, I believe that the chosen sample is adequate and sufficient to generalize the ideas.

This study uses a Linear Function to estimate the impact of the independent variables on the nation's Olympic performance, represented by medal count.

$$Mt = \alpha_1 + \beta_1.HDI_t + \beta_2.GDP_t + \beta_3.(school_enrollment)_t + \beta_4.(rural_pop)_t + \beta_5.D + \epsilon_i$$

where D is the dummy variable which takes the value 1 for the host nation, else zero and ϵ_i is the noise or the error term. Each variable is conceptualized as follows:

M_t: Count of Medals won by a country at a particular Olympic Game. In this study, I have incorporated the methodology as per the Moosa & Smith's 2004 article, for the weighted system of medal count i.e. assigning weights of 0.5, 0.3, and 0.2 for Gold, Silver and Bronze, respectively.

GDP_t, HDI_t, (school_enrollment)_t and (rural_pop)_t denotes the GDP per capita, Human Development Index of the country, Net School Enrollment(%) and Rural Population(% of the total population) of the country at the same year.

D denotes the dummy variable for the hosting countries, taking the value as 1 if the country was hosting the Olympic in the same year, else 0.

For the research analysis to hold true, the coefficient of all the independent variables needs to be positive, except for the one having a negative relation. All the variables have been operationalized with the help of measurement criteria as indicated by the table below:

Table 1: Measurement criteria

Dimension	Dependent Variable	Indicator	Hypothesized sign
Olympic Performance	Medal Count (M_t)	Number of medals won by a country in a particular Olympic	N/A
Independent Variables			
Economic Development	GDP per capita, GDP_t	The per capita GDP (measured in PPP current international dollars) of a country at a particular Olympic year	+
Social Development	Human Development Index, HDI_t	The Human Development Index of a country at a particular Olympic year	+
Geographic Environment	Hosting Country, D_t	1 if the country is the hosting country of the year or 0 otherwise	+
Education Environment	Primary School Enrollment, ($school_enrollment$) $_t$	Net School Enrollment(%) of a country at a particular Olympic year	+
Demographic Environment	Rural population, ($rural_pop$) $_t$	Rural Population(% of the total population) of the country at a particular Olympic year	-

3. EMPIRICAL RESULTS

3.1 GDP per capita and medal count

The below scatter diagram has been drawn basis the data collected with respect to GDP per capita of countries winning at least one Olympic medal in Beijing 2008 Games.

The line shows the trend relationship between Olympic Performance and country GDP per capita. Accordingly, the scatter diagram shows weak positive relationship between the GDP per capita and the Olympic performance. However, it doesn't numerically show the strength of relationship between these variables and therefore, the statistical calculations such as correlation coefficient and regression(R square) were calculated using MINITAB 14.

The coefficient of correlation between the variables under study is valued at 0.192. The value statistically shows weak correlation between the Olympic Performance and GDP per capita. Also, the R square of 3.7% shows that country GDP per capita explains about 3.7% of the variations in the Olympic performance of the country.

One might claim that GDP should have some impact on the Olympic Performance. Indeed, it makes sense as more money per capita can buy better sporting facilities, coaches, other arrangements, etc. When we combine population and GDP we get closer to the truth, but are still unable to explain the former. Based on a combination of population and GDP, a study done by Krishna and Haglund, China should have won 20 medals in the 2004 Olympics and India 19. However, the reality is China won 63 and India bagged just one. In other words, even with GDP thrown in, some countries punch way above their weight, while others much below.

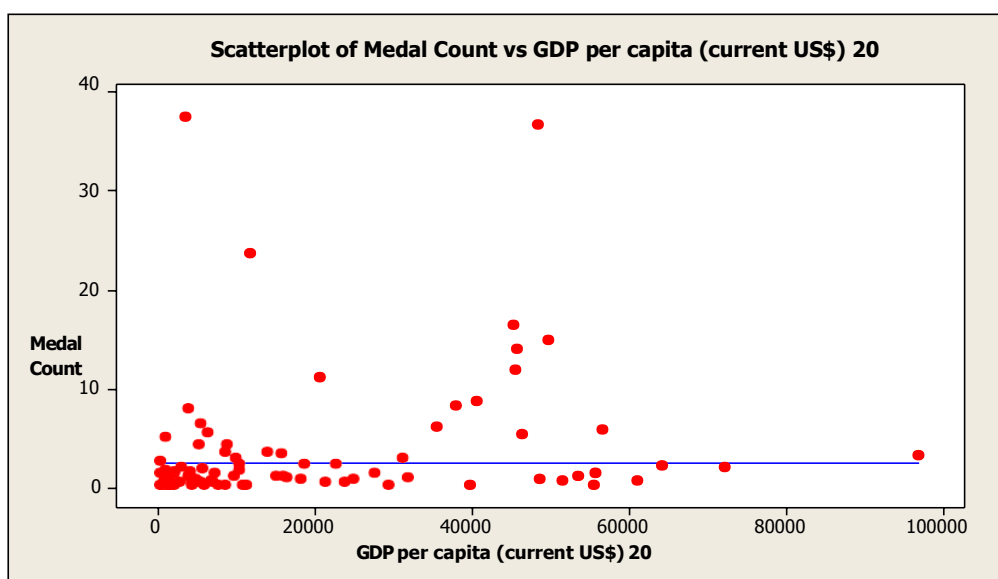


Fig. 1: GDP per capita and medal count

3.2 Human development index and medal count

The below scatter diagram is drawn from the data collected with respect to HDI of countries winning at least one Olympic medal in Beijing 2008 Games.

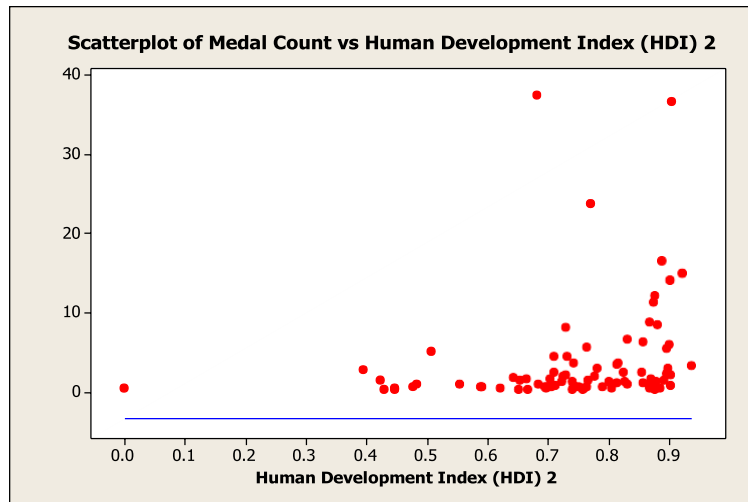


Fig. 2: Human development index and medal count

The line shows the trend relationship between Olympic Performance and country HDI. Accordingly, the scatter diagram shows very poor positive relationship between the HDI and the Olympic performance. However, it doesn't numerically show the strength of relationship between these variables and therefore, the statistical calculations such as correlation coefficient and regression (R Square) were calculated using MINITAB 14.

The coefficient of correlation between HDI and Olympic Performance is valued at 0.225. The value statistically shows good correlation between the Olympic Performance and HDI. Also, the R square of 5.1% shows that country HDI explains about 5.1% of the variations in the Olympic performance of the country. Also, regression analysis supports this through obtaining 9.63 (HDI) in 2008 and the p value is also 0.041, hence the hypothesis is accepted with respect to the Beijing 2008 Games.

***Regression equation:** $Medal\ Count = -3.44 + 9.63\ Human\ Development\ Index\ (HDI)$;

Thus, in this case, with p value of 0.041 ($p < 0.05$) implies we reject the null hypothesis and can claim that Olympic Performance does depend on HDI.

***p VALUE:** When we perform a hypothesis test in statistics, a p-value helps you determine the significance of your results. In this study, the hypothesis is if HDI has any relation with Olympic Performance. In other words:

NULL HYPOTHESIS: Olympic Performance doesn't depend on HDI

ALTERNATIVE HYPOTHESIS: Olympic Performance depends on HDI

- A small p-value (typically ≤ 0.05) indicates strong evidence against the null hypothesis, so you reject the null hypothesis.
- A large p-value (> 0.05) indicates weak evidence against the null hypothesis, so you fail to reject the null hypothesis.

3.3 Hosting country and medal count

The below scatter diagram has been drawn basis the data collected with respect to Host City of countries winning at least one Olympic medal in Beijing 2008 Games.

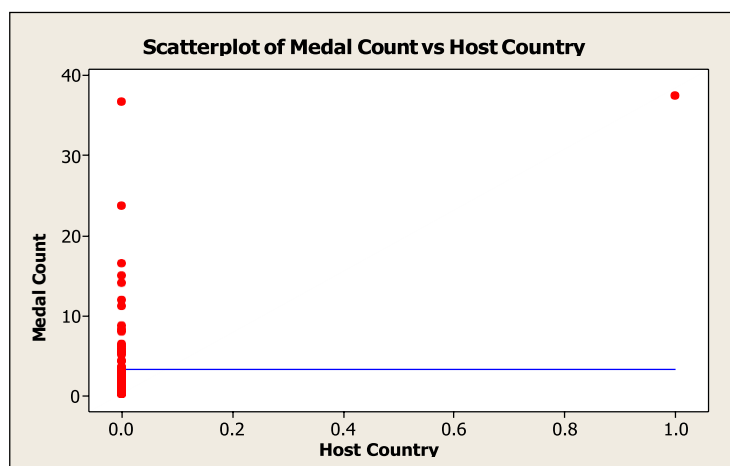


Fig. 3: Hosting country and medal count

The line shows the trend relationship between Olympic Performance and country Host City. Accordingly, the scatter diagram shows positive relationship between the Host city and the Olympic performance. However, it doesn't numerically show the strength of relationship between these variables and therefore, the statistical calculations such as correlation coefficient and regression (R Square) were calculated using MINITAB 14.

The coefficient of correlation between Host City and Olympic Performance is valued at 0.558. The value statistically shows good correlation between the Olympic Performance and Host city. Also, the R square of 31.2% shows that country Host City explains about 31.2% of the variations in the Olympic performance of the country. Also, regression analysis supports this through obtaining 34.1(Host city) in 2008 and p value is also 0.000, hence the hypothesis is accepted with respect to Beijing 2008 Games.

Regression Equation: Medal Count = 3.32 + 34.1 (Host Country 2008)

3.4 Primary school enrollment and medal count

The below scatter diagram has been drawn basis the data collected with respect to primary school enrollment of countries winning at least one Olympic medal in Beijing 2008 Games.

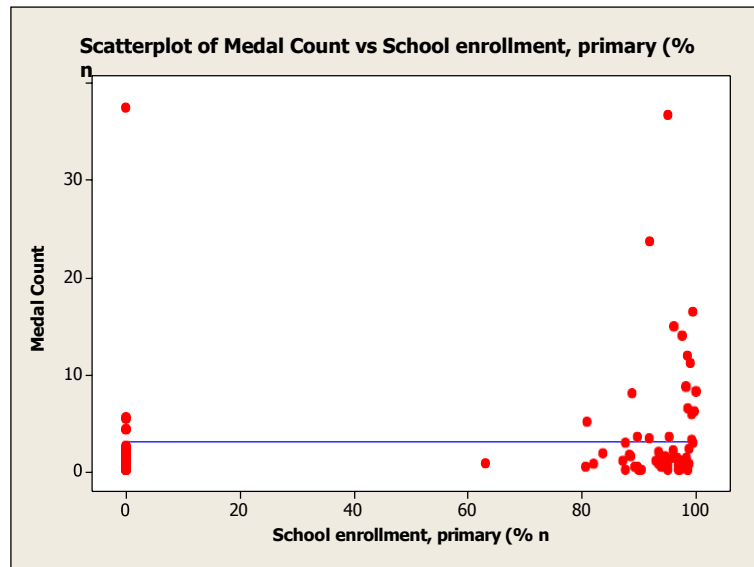


Fig. 4: Primary school enrollment and medal count

The line shows the trend relationship between Olympic Performance and country primary school enrollment. Accordingly, the scatter diagram shows poor positive relationship between the country primary school enrollment and the Olympic performance. However, it doesn't numerically show the strength of the relationship between these variables. The statistical calculations such as correlation coefficient and regression (R square) were calculated using MINITAB 14.

The coefficient of correlation between the variables under study is valued at 0.056. The value statistically shows very weak correlation between the Olympic Performance and primary school enrollment. Also, the R square of 0.3% shows that country primary school enrollment explains only 0.3% of the variations in the Olympic performance of the country.

3.5 Rural population and medal count

The below scatter diagram has been drawn basis the data collected with respect to Rural population in the countries winning at least one Olympic medal in Beijing 2008 Games.

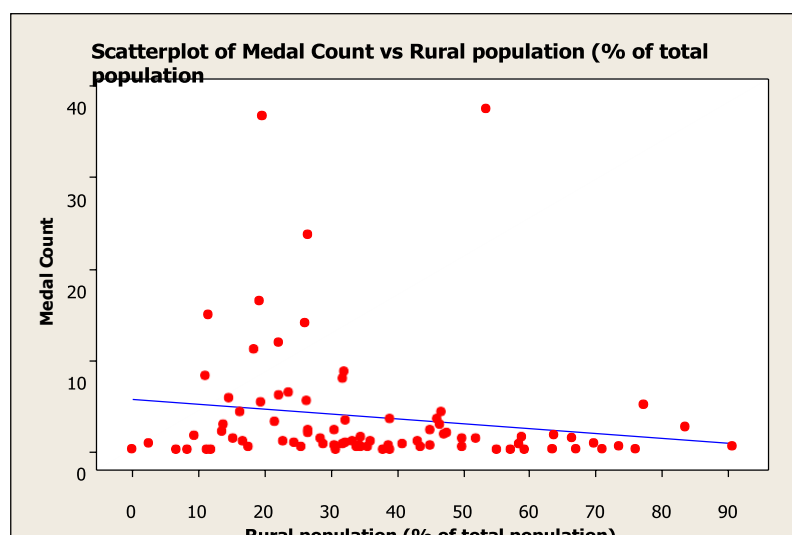


Fig. 5: Rural population and medal count

The line shows the trend relationship between Olympic Performance and country rural population. Accordingly, the scatter diagram shows poor negative relationship between the country primary school enrollment and the Olympic performance.

However, it doesn't numerically show the strength of relationship between these variables. The Statistical calculations such as correlation coefficient and regression (R square) were calculated using MINITAB 14.

The coefficient of correlation between the variables under study is valued at -0.159. The value statistically shows weak negative correlation between the Olympic Performance and rural population. Also, the R square of 2.5% shows that country rural population explains only 2.5% of the variations in the Olympic performance of the country.

3.6 Overall results

After studying the individual impact of the independent variables on the dependent variable, I would take one step ahead and would like to analyze the overall impact of these variables on the Olympic Performance.

3.6.1 Regression equation:

$$\text{Medal Count} = -1.60 + 0.000034 (\text{GDP per capita}) + 0.0165 (\text{School enrollment}) + 5.08 (\text{HDI}) \\ + 36.4 (\text{Host Country}) - 0.0181 (\text{Rural population})$$

R square of 0.394 provides us some information about the goodness of fit of a model or percent of variance explained by the model. Thus, it indicates that about 39.4% of the variations in the Olympic Performance of the country could be explained by these independent variables under study.

4. CONCLUDING REMARKS

As a conclusion, on analysing developing countries and their performance in Olympic Games, there is no worse than India. It seems strange that a country with more than 1.3 billion population can only collect an average of less than one medal per Olympic Games. In view of the 2008 Olympic Games, India won 3 medals, implying over 383 million people per medal, the highest ratio of all competing nations at Beijing.

It would be wrong to say that India does not produce good sportspersons. In games like cricket, badminton and tennis, we have produced some great world-class talent. Thus, there is no doubt that India has a sporting talent, but why does it fail to translate the same into Olympic success.

One of the reasons has been well explained by Krishna and Haglund in their research paper (2008), wherein they suggested that total population of a country is irrelevant when it comes to Olympic success. Rather what matters is the part of the population that "participates effectively" in sports. Quoting a statement from the same report by Krishna and Haglund "Olympians are drawn, not from the entire population of a country, but only from the share that is effectively participating. Low medal tallies can arise both because a country has very few people and because very few of its people effectively participate." To further contend that there are certain factors that limit effective participation. Among them, few are:

- (a) **Health Hypothesis:** An unhealthy individual is unlikely to participate in sports.
- (b) **Education Hypothesis:** An educated individual is likely to be more optimistic and ambitious and school attendance increases the chance that the talent will be spotted and developed.
- (c) **Public Information:** An individual can only aspire to be an Olympic athlete if he or she has heard about the Olympics via the media i.e. radio, television, print or digital.
- (d) **Lack of connectivity:** In countries where there is little or lack connectivity and infrastructure especially in remote, isolated villages i.e. population's ability to travel, many potential great athletes may go undiscovered.

In India, where life expectancy and school enrolment (at primary level) are below the world average and where there is relative limited access to the outside world both, physically and in terms of communication, the effective participating population dramatically reduces.

Other socio-cultural factors impacting India's performance could be:

- Indian parents giving more importance to academics than to sports
- Lack of good sports facilities for the participating population
- Lack of proper equipment, inadequate coaching and support staff
- Lack of athlete-friendly sporting policies at the Central and State Government levels, etc.

In addition to this, corruption, favoritism, apathy and bad management among sports governing bodies is likely to be a key factor explaining poor performance at the Olympic Games.

India is a growing developing economy, and young Indians should be given the opportunity and facilities to learn and excel at sports. Sporting excellence needs to be respected and should be seen to provide players opportunities to a livelihood similar to what academic excellence offers.

As India moves forward to develop a better sports infrastructure, better governance and can provide its citizens good health, education and equal rights, the day won't be far when India will be competing with the world's Olympic champions, whether it be

the US, Russia, China or for that matter, Cuba.

5. REFERENCES

- [1] 'Who Wins the Olympic Games: Economic Resources and Medal Totals' (2004), Review of Economics and Statistics, 86(1), pp 413-17. Authors: Andrew Bernard, Meghan Busse
- [2] Why Do Some Countries Win More Olympic Medals? Lessons for Social Mobility and Poverty Reduction Vol. 43, Issue No 12, (2008). Authors: Anirudh Krishna, Eric Haglund.
- [3] 'Poverty and Democratic Participation Reconsidered: Evidence from the Local Level in India' (2006), Comparative Politics, 38(4), pp 439-58. Author: Anirudh Krishna.
- [4] World Development Indicators – The World Bank (Databank)
- [5] The Human Development Report 2016 'Human Development for Everyone'
- [6] Economic Development Indicators as Determinants of Medal Winning at the Sydney Olympics: An Extreme Bounds Analysis. Authors: Imad Moosa, Lee Smith.