

# Factors Influencing Maltese International Sports Performance in the Pan-European and Microstate Contexts: An Empirical Study

Matthew Muscat-Inglott\*, Corissa Vella White

Corresponding Author: [Matthew.Muscat.Inglott@mcast.edu.mt](mailto:Matthew.Muscat.Inglott@mcast.edu.mt)

\*Institute of Community Services, MCAST

**Abstract:** Little scholarly attention has so far been given to discerning macro-level factors influencing Maltese underperformance in international sport. Degrees of financial investment, as well as national socio-economic metrics like Gross Domestic Product (GDP) and the Corruption Perceptions Index (CPI) have previously been linked with international sports performance outcomes in larger countries, so we carried out a three-stage study to explore if and how such relationships scale down from the pan-European to small-state contexts, and what implications they might have for Maltese sport. We used a post-positivist quantitative approach, with statistical analysis of secondary data using ordinary least squares regression and basic comparison of proportions. GDP and population were the strongest predictors of Olympic success at the pan-European level, more so than actual total financial investment. At the small-state level, however, GDP per capita was more predictive than GDP alone, while CPI was the strongest predictor of all. A more fine-grained comparative analysis between Malta and other small states supported the notion that a Maltese 'underperformance' problem does indeed exist. The findings clearly show a disconnect between competitive sports and non-competitive physically active recreation in Maltese policy-making, where a more holistic approach appears warranted. While Malta, like any small state, would meanwhile do well to maximise its GDP per capita and lower systemic corruption in pursuit of better international sports performance, more empirical research is needed to fully understand and eventually control the underperformance problem.

**Keywords:** International sports performance, Malta, European small states, macro factors, GDP, corruption.

## Introduction

In an academic review of literature, Grech, Toering and Collins (2019) examine Malta's contentious status in the world of elite sports. They acknowledge a chronic 'underperformance' problem, manifesting not only when competing with much larger countries, but also in the case of comparable European small states with populations of under one million. Iceland in particular remains an oft cited exemplar in discussions of Maltese underperformance, given its smaller population yet comparatively favourable track record in international sporting accomplishments. While academic literature on the matter is scarce, international sports performance by Maltese athletes has nonetheless been the subject of much debate in the local press.

Funding, or lack thereof, is a common bone of contention (Azzopardi 2021). To local sports professionals engaged in the day-to-day realities of sport in Malta, periodic announcements from politicians about increasing investment in sport (see Grima 2017; Costa 2018; Costa 2019), would seem more like hollow political theatrics than meaningful attempts to affect

systemic change. It has been posited that recent disjointed COVID-related policy decisions regarding sport and physical activity, combined with a continuing lack of any dedicated ministry for sport, continue to betray a deep-rooted and fundamental collective lack of interest in sport (Times of Malta 2020).

While local stakeholders with a genuine interest in raising standards continue to posit various assumptions about causal factors influencing Malta's lagging national sporting achievements, local press attention notwithstanding, Grech et al. (2019) suggest that formal scholarly attention has so far been overly focused on the micro-level of individual Maltese athletes, rather than on the broader meso- and macro-levels of organisational and socio-cultural factors. In this sense, we aim to make a contribution to this nascent scholarly field by analysing empirical data on macro-level socio-economic factors potentially affecting Malta's performance in international sport.

Internationally, sports researchers have shown that financial investment and other socio-economic factors have a positive effect on tangible sports performance outcomes like Olympic medal counts (Hogan and Norton 2000; Lozano, Villa, Guerrero and Cortés 2002; Li, Liang, Chen and Morita 2008; Rosas and Flegl 2019; Jarowek, Karaszewski, Kuczmarska & Kuzel 2020). Lozano et al. (2002) posited classical 'population-GDP theory', which seeks to explain measurable national sports performance outcomes as a function of a given country's population and Gross Domestic Product (GDP). Rosas and Flegl (2019) further showed that Corruption Perceptions Index (CPI) also had a statistically significant effect on medal counts at the 2016 Rio summer Olympics.

Taking these assumptions collectively as population-GDP and CPI theory, we decided to test their explanatory power at both the pan-European and European small-state levels, as well as explore their specific implications for Maltese sport. We planned a three-stage post-positivist quantitative study of multistage-sampled secondary empirical data, motivated primarily by the following three questions:

1. What are the key factors affecting measurable sports performance outcomes at the pan-European level?
2. How do these key factors affect measurable sports performance outcomes specifically at the European small-state level?
3. What key theoretical differences follow, in a direct comparison between socio-economic factors and national performance outcomes in Malta and other small states?

First we describe our research methodology for each of the three stages in turn, as well as how we operationalised our variables from a range of secondary data sources in each instance. We then present our findings for each stage, narrowing in focus from the factors at play in the broader pan-European landscape first, followed by their influence specifically at the small-states level, and finally, to the observable realities of Maltese performance in international sport when compared directly with other European small states. In conclusion, based on our findings, we present several recommendations for future research and practice.

## Methodology

### *Stage One*

Our main aim in Stage one was to test the assumptions of population-GDP and CPI theory (Lozano et al. 2002; Rosas & Flegl 2019) in the pan-European context using a subset of *Eurostat* (<https://ec.europa.eu/eurostat>) data. Included in this pan-European stage of the

analysis, as dictated by the content of the *Eurostat* data itself, were 31 countries, namely, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

We extrapolated data on population, GDP, as well as investment in sport and recreation between the years 2012 and 2018. Data on CPI was sourced directly from *Transparency International* (<http://www.transparency.org>). We took total medal counts from all summer and winter Olympic games within the same time period (London 2012, Sochi 2014, Rio 2016 and Pyeonghchang 2018), from *Olympic Analytics* (<http://www.olympanalyt.com/>) as our main dependent variable for determining international sports performance. Table 1 (below) shows all the variables for each country we were able to operationalise from the above sources and datasets, spanning the seven-year period between 2012 and 2018.

<i>Stage one variables</i>		
Variable	Description	Model
$Y$	Total Olympic medal count	$Y = Medals_{2012} + Medals_{2014} + Medals_{2016} + Medals_{2018}$
$X_1$	Mean GDP	$X_1 = (GDP_{2012} + \dots + GDP_{2018}) / 7$
$X_2$	Mean Population	$X_2 = (Population_{2012} + \dots + Population_{2018}) / 7$
$X_3$	Mean GDP per capita	$X_3 = X_1 / X_2$
$X_4$	Mean CPI	$X_4 = (CPI_{2012} + \dots + CPI_{2018}) / 7$
$X_5$	Total investment	$X_5 = (Investment_{2012} + \dots + Investment_{2018}) / 7$
$X_6$	Total investment per capita	$X_6 = X_5 / X_2$
$X_7$	Total investment as a percentage of GDP	$X_7 = X_5 / X_1$

**Table 1:** Descriptions and models operationalising the variables for Stage one

The data were imported to *R Studio Cloud* online statistical analysis software (<https://rstudio.cloud/>). We used basic Ordinary Least Squares (OLS) linear regression analysis (*'lm'* and *'summary'* model functions in *R*), to explore the effects of our explanatory variables ( $X_1, \dots, X_7$ ) on total Olympic medal count ( $Y$ ) as our main dependent variable. We began our analysis by testing the models shown (below) in Table 2.

<i>Stage one regression models</i>		
	Model	Description
1	$\bar{Y} = a + bX_1$	Olympic medals $\leftarrow$ GDP
2	$Y = a + bX_2$	Olympic medals $\leftarrow$ Population
3	$Y = a + bX_3$	Olympic medals $\leftarrow$ GDP per capita
4	$Y = a + bX_4$	Olympic medals $\leftarrow$ CPI
5	$Y = a + bX_5$	Olympic medals $\leftarrow$ Total investment
6	$Y = a + bX_6$	Olympic medals $\leftarrow$ Total investment per capita
7	$Y = a + bX_7$	Olympic medals $\leftarrow$ Total investment / GDP

**Table 2:** Summary and descriptions of regression models for analysis in Stage one

### Stage Two

Our aim in Stage two was to next test the assumptions of population-GDP and CPI theory in the European small-state context. For this part, we included those nine European countries with populations under 1M, that participated in the Games of the Small States of Europe (GSSE) between 2013 and 2019, namely, Andorra (AND), Cyprus (CYP), Iceland (ISL), Liechtenstein (LIE), Luxembourg (LUX), Malta (MLT), Monaco (MCO), Montenegro (MNE) and San Marino (SMR). Given that information on all of these small states was not available from *Eurostat* to fully operationalise our explanatory variables for the desired time period

as in Stage one, we instead used a larger dataset (<http://www.countryeconomy.com>) for GDP and population data. We again used *Transparency International* for the CPI, although indexes were not available for Andorra, Monaco and San Marino. As our main dependent variable we took total medal counts from all editions of the biennial GSSE from 2013 to 2019 (<http://www.eocgsse.org/>). Table 3 (below) shows all the variables we were able to operationalise from the above sources.

<i>Stage two variables</i>		
Variable	Description	Model
$Y$	Total GSSE medal count	$Y = Medals_{2013} + Medals_{2015} + Medals_{2017} + Medals_{2019}$
$X_1$	Mean GDP	$X_1 = (GDP_{2012} + \dots + GDP_{2018}) / 7$
$X_2$	Mean Population	$X_2 = (Population_{2012} + \dots + Population_{2018}) / 7$
$X_3$	Mean GDP per capita	$X_3 = X_1 / X_2$
$X_4$	Mean CPI	$X_4 = (CPI_{2012} + \dots + CPI_{2018}) / 7$

**Table 3:** Descriptions and models operationalising the variables for Stage two

As in Stage two, we used OLS regression to explore the effects of this smaller set of explanatory variables ( $X_1, \dots, X_4$ ) on GSSE medal count ( $Y$ ) as our main dependent variable, as shown (below) in Table 4.

<i>Stage two regression models</i>		
	Model	Description
1	$Y = a + bX_1$	GSSE medals $\leftarrow$ GDP
2	$Y = a + bX_2$	GSSE medals $\leftarrow$ Population
3	$Y = a + bX_3$	GSSE medals $\leftarrow$ GDP per capita
4	$Y = a + bX_4$	GSSE medals $\leftarrow$ CPI

**Table 4:** Summary and descriptions of regression models for analysis in Stage two

### Stage Three

Based on the assumptions of population-GDP and CPI theory, and the findings from stages one and two, we finally carried out a comparative analysis via equivalence of proportions to examine the differences between Malta and average small states values, and finally, the differences more specifically between Malta and Iceland. In the latter case, we used a more fine-grained dataset sourced directly from the relevant competent governmental authorities in Malta and Iceland (as part of one of the authors' on-going doctoral research). Given that the *Eurostat* data included investment in "sport and recreation", the new data showed the investment made by Malta and Iceland exclusively in competitive sport alone. Apart from GDP, population, GDP per capita, CPI and total GSSE medals, therefore, we were also able to further examine the ratios between the two countries concerning investment in sport and recreation overall, sport alone, and recreation alone. We also compared the two countries on the basis of investment per capita, and investment as a percentage of GDP.

**Stage three proportion variables**

Data	Proportion: Malta/Small states average	Proportion: Malta/Iceland
GDP per capita	$P_A = (GDP_{MLT}/POP_{MLT}) / ((GDP_{MLT}/POP_{MLT}) + (GDP_{AVE}/POP_{AVE}))$	$P_F = (GDP_{MLT}/POP_{MLT}) / ((GDP_{MLT}/POP_{MLT}) + (GDP_{ISL}/POP_{ISL}))$
GDP*	$P_B = GDP_{MLT} / (GDP_{MLT} + GDP_{AVE})$	$P_G = GDP_{MLT} / (GDP_{MLT} + GDP_{ISL})$
Population**	$P_C = POP_{MLT} / (POP_{MLT} + POP_{AVE})$	$P_H = POP_{MLT} / (POP_{MLT} + POP_{ISL})$
CPI	$P_D = CPI_{MLT} / (CPI_{MLT} + CPI_{AVE})$	$P_I = CPI_{MLT} / (CPI_{MLT} + CPI_{ISL})$
Medals	$P_E = Medals_{MLT} / (Medals_{MLT} + Medals_{AVE})$	$P_J = Medals_{MLT} / (Medals_{MLT} + Medals_{ISL})$
Investment in sport & recreation*	/	$P_K = TotInv_{MLT} / (TotInv_{MLT} + TotInv_{ISL})$
Investment in recreation*	/	$P_L = RecrInv_{MLT} / (RecrInv_{MLT} + RecrInv_{ISL})$
Investment in sport*	/	$P_M = SptInv_{MLT} / (SptInv_{MLT} + SptInv_{ISL})$
Total investment per capita	/	$P_N = (TotInv_{MLT}/POP_{MLT}) / ((TotInv_{MLT}/POP_{MLT}) + (TotInv_{ISL}/POP_{ISL}))$
Investment in sport per capita	/	$P_O = (SptInv_{MLT}/POP_{MLT}) / ((SptInv_{MLT}/POP_{MLT}) + (SptInv_{ISL}/POP_{ISL}))$
Investment in sport as % GDP	/	$P_P = (TotInv_{MLT}/GDP_{MLT}) / ((TotInv_{MLT}/GDP_{MLT}) + (TotInv_{ISL}/GDP_{ISL}))$

**Table 5:** Descriptions and models operationalising the variables for Stage three (\*Millions of Euros, \*\*Millions of people)

Table 5 above shows the variables included at this stage, as well as how they were operationalised as proportions ready for equivalence testing in the hypotheses we devised, shown below in Table 6.

**Stage three hypotheses**

	Null	Alt
<i>Compared to the small states average values:</i>		
H <sub>1</sub> Maltese medal counts are in proportion to its GDP per capita	$H_0: P_E = P_A$	$H_a: P_E \neq P_A$
H <sub>2</sub> Maltese medal counts are in proportion to its CPI	$H_0: P_E = P_D$	$H_a: P_E \neq P_D$
<i>Compared to the Icelandic values:</i>		
H <sub>3</sub> Maltese medal counts are in proportion to its GDP per capita	$H_0: P_J = P_F$	$H_a: P_J \neq P_F$
H <sub>4</sub> Maltese sport and recreation total investment is in proportion to its GDP per capita	$H_0: P_K = P_F$	$H_a: P_K \neq P_F$
H <sub>5</sub> Maltese investment in sport alone is in proportion to its GDP per capita	$H_0: P_F = P_M$	$H_a: P_F \neq P_M$
H <sub>6</sub> Maltese medal counts are in proportion to its CPI	$H_0: P_J = P_I$	$H_a: P_J \neq P_I$

**Table 6:** Descriptions and models for hypotheses tested in Stage three

## Results and Discussion

### Stage One

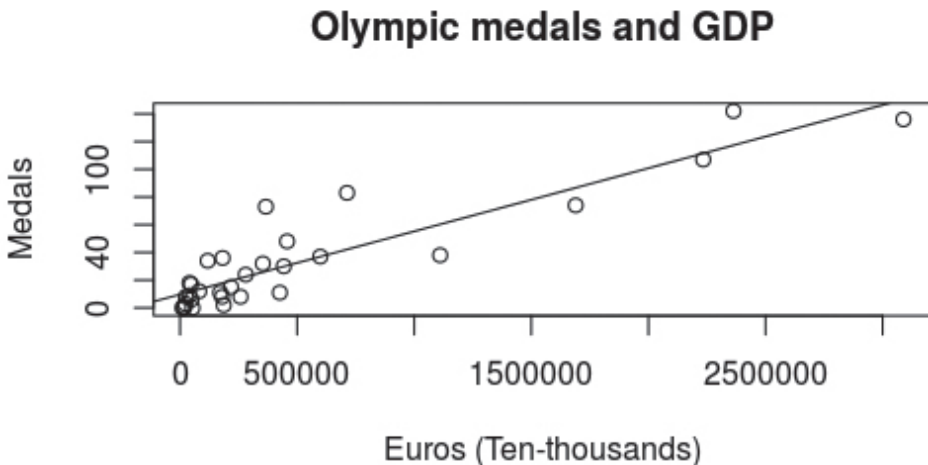
The results for the models tested in Stage one are shown (below) in Table 7. GDP had the strongest effect ( $t=11.73, p<.001$ ) on Olympic medal count (see Fig. 1) among all the explanatory variables tested, accounting for 83% of the variation in Olympic medals won between 2012 and 2018. Population alone also had a relatively strong effect ( $t=8.07, p<.001$ ), explaining 69% of the variation in the dependent variable (see Fig. 2). Our pan-European analysis, therefore, supports Lozano et al. (2002), and the general assumptions of population GDP theory, given that GDP and population were the two strongest sole predictors of Olympic success.

**Stage one pan-European results**

	Model	Description	beta	Significance	R <sup>2</sup>
1	$Y=a+bX_1$	Olympic medals ← GDP	.000046	t=11.73, p<.001***	.83
2	$Y=a+bX_2$	Olympic medals ← Population	1.42	t=8.07, p<.001***	.69
3	$Y=a+bX_3$	Olympic medals ← GDP per capita	.00035	t=1.03, p=.31	.04
4	$Y=a+bX_4$	Olympic medals ← CPI	.82	t=1.82, p=.08	.10
5	$Y=a+bX_5$	Olympic medals ← Total investment	.01	t=7.64, p<.001***	.67
6	$Y=a+bX_6$	Olympic medals ← Total investment per capita	-.0012	t=-.026, p=.98	<.001
7	$Y=a+bX_7$	Olympic medals ← Total investment / GDP	-10.07	t=-.66, p=.52	.01

**Table 7:** Regression analysis results for pan-European models  
(\*\*\*Significant at 99.999% confidence level)

While total investment itself accounted for 67% of the variation in medal count, and had a statistically significant effect (t=7.64, p<.001), it is interesting to note that the sheer amount of financial investment made in sport did not predict Olympic success as strongly as either GDP or overall population. When adjusted per capita, total investment had no discernible effect whatsoever (t=-.026, p=.98). Indeed, the effect of GDP was so strong that, when controlling for it ( $Y=a+b_1X_1+b_5X_5$ ), sheer total investment in sport did not account for any additional significant variation in medal count (t=.24, p=.81), resulting in a drop in explanatory power ( $R^2$ ) of the model for GDP alone, from 83 to 81%. In other words, the effect of GDP was so strong, that once it was accounted for, the degree of investment in sport made little extra difference. Similarly, total investment did not have a significant effect when taken as a percentage of GDP (t=-.66, p=.52), indicating that prioritising sport investment in the context of the broader economy did not matter as much as the sheer overall value of GDP itself.



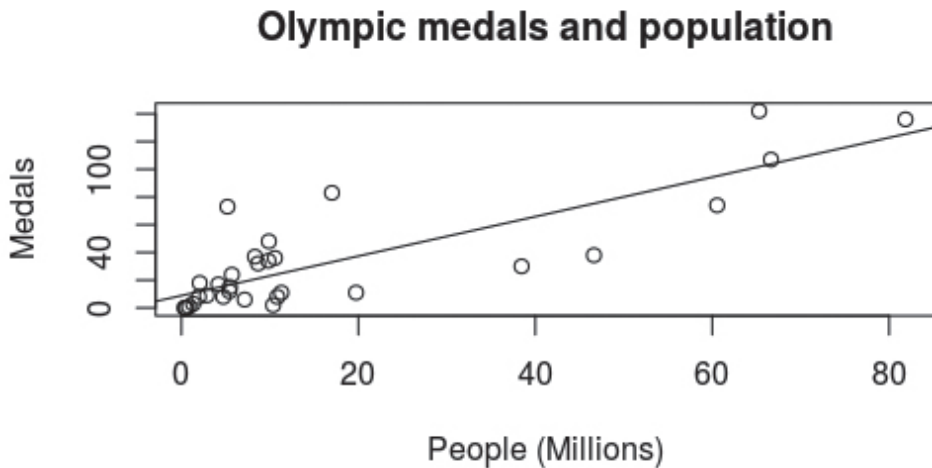
**Figure 1:** Scatterplot with fitted regression line showing pan-European association between Olympic medals and GDP

GDP is generally considered to be an indicator of the overall state of health of a national economy, so the relationship between GDP and international sports performance is likely complex. Given that multiple factors are expressed within the GDP statistic, our finding cannot show how these various elements work to specifically affect international sports performance. What it does show, however, is that whatever productive forces are fundamentally at play in a given country to improve its economic performance will also

improve its sporting performance. Given the evidence, an examination of potentially transferable strategies and good practices in *economically* high-performing local sectors may be a worthy exercise for sports administrators in any country.

The effects of CPI, on the other hand, were not statistically significant ( $t=1.82, p=.08$ ), and accounted for only 10% of the variation in Olympic medal count. In other words, based on *Eurostat* data averaged over the seven-year period between 2012 and 2018, our findings do not show that corruption had a significant effect on national sports performance, challenging the validity of CPI theory (Rosas & Flegl 2019) specifically in the pan-European context.

Upon closer inspection of the results, the lack of effect of GDP when adjusted per capita ( $t=1.03, p=.31$ ), as well as total investment in sport ( $t=-.026, p=.98$ ), would suggest that, while the tenets of population-GDP theory generally hold at the pan-European level, they act independently as predictors of success, and do not interact. In other words, while a country at pan-European level may achieve Olympic success given it has a high GDP, it can also do so, to a lesser extent, by simply having a large enough population. Neither factor, at this level, necessarily depended on the other in facilitating success at the summer or winter Olympic games.



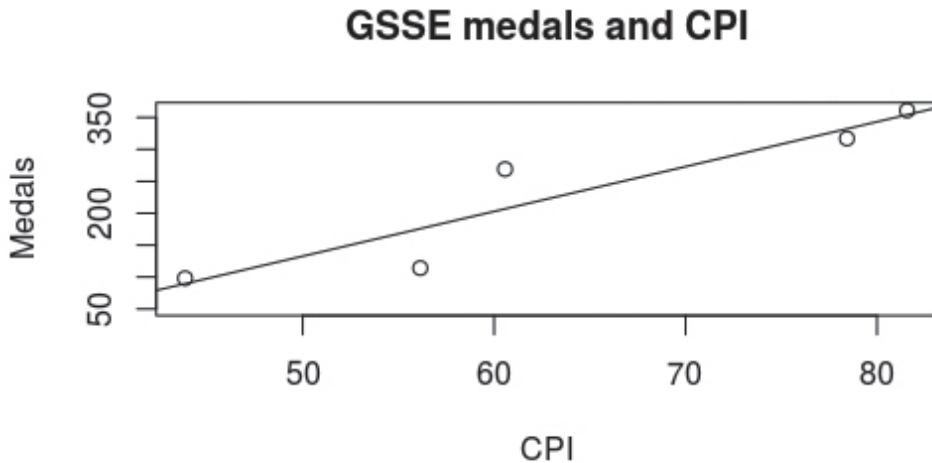
**Figure 2:** Scatterplot with fitted regression line showing pan-European association between Olympic medals and population

Stage two

<i>Stage two small-states results</i>					
	Model	Description	beta	Significance	R <sup>2</sup>
1	$Y=a+bX_1$	GSSE medals ← GDP	.006	$t=4.39, p<.01^{**}$	.73
2	$Y=a+bX_2$	GSSE medals ← Population	49.29	$t=.23, p=.83$	<.01
3	$Y=a+bX_3$	GSSE medals ← GDP per capita	.0036	$t=5.04, p<.01^{**}$	.75
4	$Y=a+bX_4$	GSSE medals ← CPI	7.02	$t=4.28, p=.02^*$	.86

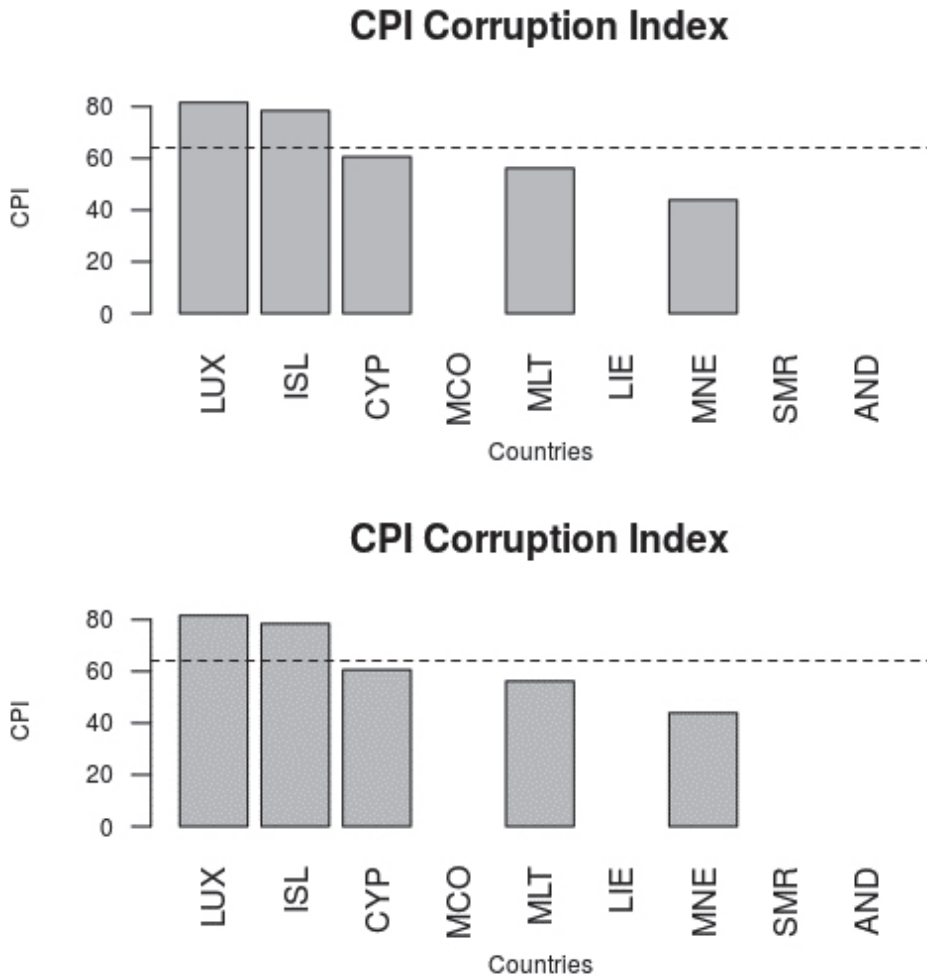
**Table 8:** Regression analysis results for pan-European models  
 (\*Significant at the 95% confidence level, \*\*Significant at 99.99% confidence level)

Table 8 above shows the results for the models we tested at the European small-state level. Building on the findings from Stage one, it was immediately evident that population-GDP theory holds relatively steadily in the European small-state context, with GDP ( $t=4.39$ ,  $p<.01$ ) accounting for 73% of the variation GSSE medals. With regard to the *interaction* between population and GDP, however, there was a key difference between the two contexts. Population alone was no longer a significant predictor of success ( $t=.23$ ,  $p=.83$ ), while GDP *per capita* became the more significant factor ( $t=5.04$ ,  $p<.01$ ). Unsurprisingly, small states cannot, by definition, rely on the sheer force of a large population for their sporting success, and must optimise their GDP to population ratio, viz. the higher the GDP and the lower the population, the better.



**Figure 3:** Scatterplot with fitted regression line showing small-states association between GSSE medals and CPI

A more striking difference between the pan-European and small-state contexts was the effect of corruption (see Fig. 3). Building on Rosas & Flegl's (2019) work on the effects of CPI on sports performance in the international context, we found CPI to be the strongest performance predictor of all at the European small-state level ( $t=4.28$ ,  $p=.02$ ), accounting for 86% of the variation in GSSE medals. The bar chart in Fig. 4 shows the CPI for small states organised in descending order from left to right according to how many total GSSE medals each country won between 2013 and 2019 (Luxembourg won the most, Andorra the least). Despite missing data for three of the nine countries, note that the chart shows CPI to be a perfect predictor of the *order* of small states according to their overall GSSE medals, i.e., the order of small states when organised according to how many medals they have won is perfectly predicted by their CPI ranks.



**Figure 4:** Bar chart showing CPI for the small states of Europe, arranged from left to right according to their medal counts

In a locally contextualised case study, Aquilina and Chetcuti (2013) posited chronic underperformance and “quasi-certainty of failure” (p. 8) in Maltese football as a risk factor for increasing the propensity of players and officials to consider participating in match-fixing and corruption, offering some unique insight into the specific dangers of corruption in underperforming small states. They cite education as the crucial preventive measure for addressing corruption in sport, and encourage Maltese stakeholders to take a tough stance, given that system-wide monitoring is actually a more realistic prospect in small states than in larger countries. While *also* permeating the sports sector, it should be noted that the corruption expressed in the CPI statistic itself is systemic. In this sense, our finding provides a clear incentive to small states intent on improving their international sports performance, to tackle corruption at every level. The strong effect of CPI on GSSE medals basically suggests that significant improvements in international sports performance are unlikely, without corresponding significant progress in lowering corruption.

## Stage three

**Stage three proportional comparative analysis descriptives**

Mean values between 2012 and 2018:	Small states average		Proportion Malta/Small states average		Proportion Malta/Iceland	
	Malta	Iceland	Malta	Iceland	Malta	Iceland
GDP per capita	21,640	25,000	49,107	$P_A=.46$	$P_F=.31$	
GDP*	9,848.14	12,874	16,544.29	$P_B=.43$	$P_G=.37$	
Population**	.4551	.5247	.3369	$P_C=.46$	$P_H=.57$	
CPI	56.14	64.11	78.43	$P_D=.47$	$P_I=.42$	
Medals	114	169	317	$P_E=.40$	$P_J=.26$	
Total investment in sport and recreation*	14.83	/	224.94	/	$P_K=.06$	
Recreation only*	7.51	/	220.28	/	$P_L=.03$	
Sport only*	7.32	/	4.66	/	$P_M=.61$	
Total investment per capita (€)	33	/	668	/	$P_N=.05$	
Sport only per capita (€)	16	/	14	/	$P_O=.54$	
Sport only as % GDP	.00074	/	.00028	/	$P_P=.73$	

**Table 9:** Descriptives for comparisons between Malta, small-state averages and Iceland (\*Millions of Euros, \*\*Millions of people)

The first five rows in Table 9 (above) permit an initial evaluation of the main tenets of population-GDP and CPI theory as they relate to Malta, Iceland and the small-states averages. The remaining rows allow for a direct comparison between Malta and Iceland on the various values of sports and recreational investments made in each country between 2012 and 2018. The two columns on the right show the worked proportion variables used in the hypothesis tests that followed. Table 10 (below) shows the hypothesis-test results.

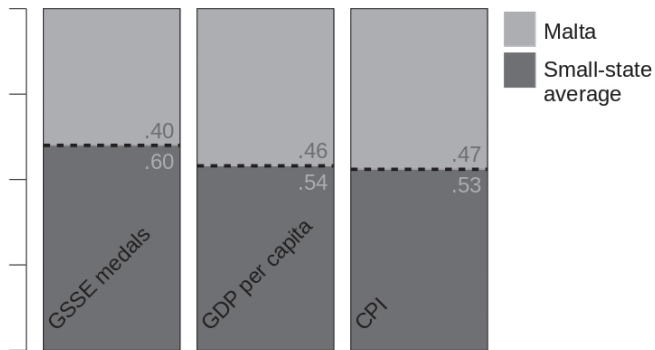
**Stage three hypothesis tests**

Description	Null	Result	$\chi^2$	p	Interpretation
<b>Proportional comparisons – Malta : Small states average</b>					
H <sub>1</sub> Medal counts and GDP per capita	$H_0: P_E=P_A$	$P_E<P_A$	35.07	<.001***	Malta won 17 medals <i>Less</i>
H <sub>2</sub> Medal counts and CPI	$H_0: P_E=P_D$	$P_E<P_D$	37.12	<.001***	Malta won 18 medals <i>Less</i>
<b>Proportional comparisons – Malta : Iceland</b>					
H <sub>3</sub> Medal counts and GDP per capita	$H_0: P_J=P_F$	$P_J<P_F$	53.34	<.001***	Malta won 18 medals <i>Less</i>
H <sub>4</sub> Total investment and GDP per capita	$H_0: P_K=P_F$	$P_K<P_F$	230.03	<.001***	Malta invested €58.51M <i>Less</i>
H <sub>5</sub> Investment in sport and GDP per capita	$H_0: P_F=P_M$	$P_F>P_M$	4.50	.03*	Malta invested €3.66M <i>More</i>
H <sub>6</sub> Medal counts and CPI	$H_0: P_J=P_I$	$P_J<P_I$	172.99	<.001***	Malta won 66 medals <i>Less</i>

**Table 10:** Hypothesis-testing results for comparative analysis under population-GDP and CPI theory (\*Significant at the 95% confidence level, \*\*\*Significant at 99.999% confidence level)

It should be noted that the  $\chi^2$  statistics cited above, and their associated p values denoting statistical significance are based on the assumption of near perfect predictive power of population-GDP and CPI theory. The models presented in Stages one and two clearly show that while GDP per capita was a strong predictor at the small-states level, it was not perfect. The comparisons made in Stage three, therefore, together with their ensuing discussion points, examine Maltese international sports performance indicators on the basis of a defined *theoretical* threshold. Figure 5 gives a visual representation of the proportions reported in Table 9 concerning our comparison of Malta to the small-states averages, on medal counts and the two strongest predictive factors (at small-states level) of GDP per capita and CPI.

### Malta to Small-state average comparison



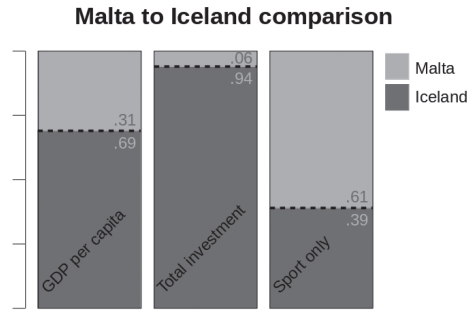
**Figure 5:** Paired bar chart showing Malta to Small-state average proportions for GSSE medals, GDP per capita and CPI

To put the comparisons and our following evaluations of them into perspective, it should be noted that one could very well begin such a comparative study by ignoring any systematic differences between countries, thereby assuming each had an equal chance of winning medals. This would result in final medal counts for each of two countries that do not differ significantly from an even 1:1 split. Under such conditions, the data clearly show that medal counts for Malta were, across the board, both below the European average and well below Iceland.

So instead of assuming an even split between countries, we adjusted our expectations according to some known systematic difference, say, GDP per capita. When comparing medals won by Malta and Iceland, for instance, we should expect Malta to win not 50% (.50) of the pooled medals, but rather (taking the difference in GDP per capita between the two countries), we would expect Malta to instead win 31% of the pooled medals. Such an evaluation can more formally be expressed as:

$$Expected\ Medals_{MLT} = P_F( Observed\ Medals_{MLT} + Observed\ Medals_{ISL} )$$

The data show, ignoring any systematic effects, that Malta won 55 medals less than the European average. If population-GDP theory holds, however (taking the difference in GDP per capita between Malta and the European average into account), then Malta won only 17 medals less than expected, and not 55. Even when controlling for GDP per capita and CPI, our findings ultimately show that when comparing Malta to the European average or Iceland, there is consistent underperformance in all the models tested (by anywhere from 17 to 66 medals less than expected). The evidence supports the notion, therefore, that there is indeed an underperformance problem at play in Malta, at least in the context of the GSSE.



**Figure 6:** Paired bar chart showing Malta to Iceland proportions for GDP per capita, total investment in sport and recreation, and investment in sport only

Proportional differences in investment between Malta and Iceland are shown above in Figure 6, with GDP per capita as a reference. For total investment according to the *Eurostat* data, which includes investment in sports *and recreation*, Malta invested significantly less than Iceland (€58.51M less). When the statistic was adjusted for investment in competitive sport alone, on the other hand, Malta invested comparatively more (€3.66M more). These findings indicate that Maltese investment in competitive sport alone had little effect on actual performance in the GSSE by Icelandic standards. They also indicate a drastic discrepancy between investment in competitive sport and non-competitive physically active recreation in Malta. Indeed, the latter has also been characterised by an element of ‘underperformance’ locally, in the form of low physical activity levels and high obesity rankings (see Kerr Cumbo, Muscat-Inglott and Caruana Bonnici 2019). So given that Malta’s investment specifically in competitive sport was the only factor that compared favourably with Iceland, financial prioritisation of competitive sport with a simultaneous neglect for promoting a more widespread physically active recreational culture in Malta would appear to be misguided.

In the *Eurostat* data, ‘recreation’ includes fitness facilities, “amusement and recreation activities”, “activities of amusement parks and theme parks”, and “other amusement and recreation activities” (Eurostat 2008). So, while it is difficult to know that measurement across the European countries has been consistent with regard to what is meant, precisely, by ‘recreation’, our analysis clearly shows that a disproportionate amount of financial investment is taking place in Malta in terms of the sport-recreation ratio. It should be noted here that Iceland’s economy is described by the US Central Intelligence Agency (2021) as being based on “free market principles, with an extensive welfare system”. Malta’s economy, on the other hand, is described simply as a free market economy. Given Malta’s *laissez faire* economic approach in comparison to Iceland, therefore, it is not surprising that certain recreational activities, such as those associated with, for instance, the sizeable exercise and fitness sector, would be left up to market forces and private enterprise with little government intervention, regulation, or investment. So as part of a more holistic strategy for improving long-term competitive sports performance in the international arena, Malta may consider an alternative national strategy of more widespread scope, involving the development of stronger basic physical activity and recreation infrastructures.

## Conclusions and Recommendations

We took total medals at the GSSE over a seven-year period as our main outcome variable at the small-states level. Future studies might also explore population-GDP and CPI theory in the small-states context using other international sports performance outcomes. Data on the results of major events in most sports are typically publicly available and easily accessible for analysis by sports researchers.

According to our findings, actual financial investment in sport, contrary to what one might expect, was not the strongest predictor of international sporting success in the context of the Olympics and GSSE between 2012 and 2018. Markers like a healthy GDP, denoting a general sense of productivity in a given society, and a high CPI, denoting trust and good governance, were the stronger predictors of international sporting success, particularly in the context of small states. Our findings support the basic notion that the amount of funds invested in local sport matters less than the extent to which its recipients are productive, well-governed and operating within an environment of trust, transparency, and fairness.

Our comparative analysis between Malta and other small states also supported the idea that, according to the empirical data, there is indeed an apparent underperformance problem at play. It was consistent in every model we tested, suggesting that the extent of the underperformance, as indicated by Maltese GSSE medal counts, was not fully explained by the independent variables included in this study. In other words, while Malta would do well, like any small state, to maximise its GDP to population ratio, and reduce systemic corruption, additional as yet unexplored factors need to be identified to more fully understand Maltese underperformance in international sport. Researchers may address this gap in future studies in a bid to understand and eventually control the underperformance problem, and better inform national sports policies.

Our analysis of investment in sport and recreation, meanwhile, highlights a disconnect between the realms of competitive sport and non-competitive recreational physical activity in Malta. A more holistic approach towards the development of both modalities of physical activity participation in Malta over the long term may serve to address not only the problem of underperformance in international sport, but also the problems of low physical activity levels and high obesity rates, simultaneously. In this respect, we caution against the consideration of off-the-shelf solutions, and urge further careful and contextualised study of prospective development strategies framed within the distinctive and unique socio-cultural and economic settings of Malta.

## References

Aquilina, D. and Chetcuti, A. 2013. Match-fixing: The Case of Malta. *International Journal of Sport Policy*, 6(1), 107-128.

Azzopardi, J. P. 2021. How a Lack of Investment in Youth is Preventing Maltese Footballers from Reaching the Next Level. Lovin Malta, March 13<sup>th</sup>. Available at: <https://lovinmalta.com/lifestyle/sport/how-a-lack-of-investment-in-youth-is-preventing-maltese-footballers-from-reaching-the-next-level/> (accessed 13 April 2021)

Central Intelligence Agency 2021. The World Factbook - CIA . Available at: <https://www.cia.gov/the-world-factbook/> (accessed 13 April 2021)

Costa, M. 2018. Don't Leave Small Nations Games Hosting Preparations till the Last Minute, Ryan Callus Urges. Maltatoday, November 5<sup>th</sup>. Available at: [https://www.maltatoday.com.mt/news/national/90679/dont\\_leave\\_small\\_nations\\_games\\_hosting\\_preparations\\_till\\_the\\_last\\_minute\\_ryan\\_callus\\_urgues?fbclid=IwAR3eP3zhly7DupXBkzhsTYOhnMsoA8uJZSOX5\\_kbDJyfd1kPdXFrVao64#.YHVds\\_yxXjE](https://www.maltatoday.com.mt/news/national/90679/dont_leave_small_nations_games_hosting_preparations_till_the_last_minute_ryan_callus_urgues?fbclid=IwAR3eP3zhly7DupXBkzhsTYOhnMsoA8uJZSOX5_kbDJyfd1kPdXFrVao64#.YHVds_yxXjE) (accessed 13 April 2021)

Costa, M. 2019. New National Sports Strategy Aims to Raise the Bar, Trigger Culture Change in Malta. Maltatoday, May 21<sup>st</sup>. Available at: [https://www.maltatoday.com.mt/news/national/95163/watch\\_new\\_national\\_sports\\_strategy\\_aims\\_to\\_raise\\_the\\_bar\\_trigger\\_culture\\_change\\_in\\_malta#.YHVbFPyxXjE](https://www.maltatoday.com.mt/news/national/95163/watch_new_national_sports_strategy_aims_to_raise_the_bar_trigger_culture_change_in_malta#.YHVbFPyxXjE) (accessed 13 April 2021)

Eurostat 2008. NACE Rev. 2: Statistical Classification of Economic Activities in the European Community. Eurostat Methodologies and Working Papers. Available at: [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwigplv5j\\_vvAhUisaQKHfHhBV8QFjAAegQIAxAD&url=https%3A%2F%2Fec.europa.eu%2Feurostat%2Fdocuments%2F3859598%2F5902521%2FKS-RA-07-015-EN.PDF&usg=AOvVaw2p7qreCykWm1ZgbAICPZ89](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwigplv5j_vvAhUisaQKHfHhBV8QFjAAegQIAxAD&url=https%3A%2F%2Fec.europa.eu%2Feurostat%2Fdocuments%2F3859598%2F5902521%2FKS-RA-07-015-EN.PDF&usg=AOvVaw2p7qreCykWm1ZgbAICPZ89)

Grech, A., Toering, T. and Collins, D. 2019. The Fairy Tale of Professional Maltese Sport: Exploring Obstacles and Hindrances in Local Elite Sports Development. [Unpublished] Available at: [https://www.researchgate.net/publication/332037257\\_The\\_fairy\\_tale\\_of\\_professional\\_Maltese\\_sport\\_Exploring\\_obstacles\\_and\\_hindrances\\_in\\_local\\_elite\\_sport\\_development](https://www.researchgate.net/publication/332037257_The_fairy_tale_of_professional_Maltese_sport_Exploring_obstacles_and_hindrances_in_local_elite_sport_development)

Grima, C. 2017. Future for Sports. Times of Malta, November 7<sup>th</sup>. Available at: <https://timesofmalta.com/articles/view/Future-for-sports.662463> (accessed 13 April 2021)

Hogan, K. and Norton, K. 2000. The 'Price' of Olympic Gold. *Journal of Science and Medicine in Sport*, 3(2), 203-218.

Jarowek, M., Karaszewski, W., Kuczmarska, M. & Kuzel, M. 2020. Investment Expenditure on Sport Infrastructure in Poland: Diagnosis, General Trends, and Possible Prospects. *Journal of Physical Education and Sport*, 20(2), 1106-1114.

Kerr Cumbo, R., Muscat-Inglott, M. and Caruana Bonnici, D. 2019. A Study of the Effects of Facility and Service Provision on Physical Activity among Students and Staff at MCAST. *MCAST Journal of Applied Research & Practice*, 3(2), 38-60.

Li, Y., Liang, L., Chen, Y. and Morita, H. 2008. Models for Measuring and Benchmarking Olympics Achievements. *Omega*, 36(6), 933-940.

Lozano, S., Villa, G., Guerrero, F. and Cortés, P. 2002. Measuring the Performance of Nations at the Summer Olympics Using Data Envelopment Analysis. *Journal of the Operational Research Society*, 53(5), 501-511.

Rosas, L. A. A. and Flegl, M. 2019. Quantitative and Qualitative Impact of GDP on Sport Performance and its Relation with Corruption and Other Social Factors. *Revista de Ciencias Sociales y Humanidades*, 8(55), 15-37.

Times of Malta 2020. The Sports Industry Deserves Better. *Times of Malta*, June 4<sup>th</sup>. Available at: <https://timesofmalta.com/articles/view/the-sports-industry-deserves-better.796203> (accessed 13 April 2021)