Who will win the Olympic Games?

Economic Briefing Paper

August 2024

pwc

Contents

Executive summary

We expect the US will top the Olympics medal table, while China takes second place and Team GB fend off France for the third spot

Based on our modelling, we expect that the US will lead the way at the Paris 2024 Olympics, with a projected total of 116 medals, followed by China (100), Great Britain (56) and France (54). This means Team GB's performance would be down compared to its medal haul at the Tokyo 2020 Olympics, but still ahead of old Olympics rivals Germany (36) and Australia (37).

Our analysis is based on economic modelling, which in turn is an imperfect science, as human behaviour cannot be modelled with precision.

Economics is not the be-all and end-all for sporting success but remains an important driver of sporting success

There is a strong correlation between the economic size of an economy and the performance of its athletes at the Olympics, but there are some notable exceptions. For instance, Jamaica consistently overperforms relative to its economic size, winning around 1.1% of all Summer Olympic gold medals since 2000, close to 56 times higher than its share of global GDP in 2023.

This shows that David can sometimes beat Goliath in the Olympic arena. However, we can't deny the economic reality that superpowers like the US and China tend to dominate the top of the medal table.

Economic might, past medal wins, and home nation advantage are statistically important predictors of Olympic success

Our econometric modelling analyses a range of drivers of success at the Olympics, including economic size, performances at previous sporting events, and whether the country is the host nation.

We find that performance at the previous Olympics and whether the country is the host nation have statistically the strongest explanatory power explaining the share of medals awarded at the Olympics. This bodes well for the French team as the Olympic Games are hosted in France's capital city Paris. Our modelling indicates that the French team will more than double their gold medal haul relative to the Tokyo 2020 Olympics.
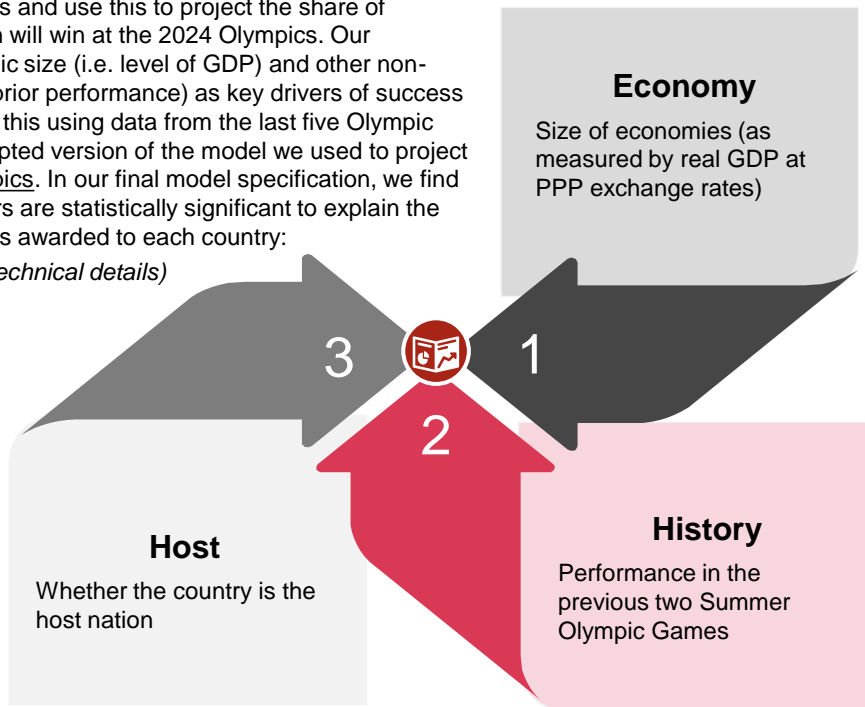
The US, China and Great Britain are expected to make up the Paris 2024 Olympics podium based on total medals

Country	Gold	Total
US	42	116
China	42	100
Great Britain	20	56

We model Olympics performance based on GDP level and other non-economic factors

We develop an economic model to explain the historic performance at the Summer Olympics and use this to project the share of medals that each nation will win at the 2024 Olympics. Our modelling uses economic size (i.e. level of GDP) and other non-economic factors (e.g. prior performance) as key drivers of success at the Olympics. We do this using data from the last five Olympic Games.[1] This is an adapted version of the model we used to project the 2012 London Olympics. In our final model specification, we find that, the following drivers are statistically significant to explain the share of the total medals awarded to each country:

(see Annex for further technical details)

3 **1** **2**

Economy

Size of economies (as measured by real GDP at PPP exchange rates)

Host

Whether the country is the host nation

History

Performance in the previous two Summer Olympic Games

Economic might is an important indicator of Olympic success but it isn't everything

India underperform at the Summer Olympics while Jamaica excels

As Figure 1 shows, there is a strong correlation between the size of an economy and the performance of its athletes at the Olympics, with a correlation coefficient of 0.82. However, there are some notable outliers. For instance, India has won just two gold medals over the last 24 years (0.1% of the total), despite accounting for around 7% of 2023 world GDP in purchasing power parity terms.

In contrast, Jamaica consistently overperforms relative to its economic size, winning around 1.1% of all Summer Olympic gold medals since 2000, close to 56 times higher than their share of 2023 world GDP. Kenya also performs relatively strongly with again 1.1% of all gold medals, while accounting for less than one percent of 2023 world GDP. This pattern could be driven by the following:

- Athletes from smaller countries may be able to train in wealthier countries (e.g. by attending US universities).

- There may be a tendency for athletes in smaller countries to specialise in a narrower range of disciplines where there is a local track record of success (e.g. long distance running for Kenya, or sprinting for Jamaica)

Whatever the explanation, it is clear that economics matters, but it is not everything when it comes to predicting performance at the Summer Olympics.

1.1%

The share of Olympic gold medals won by Jamaica since 2000, close to 56 times higher than their share of global GDP.

Figure 1: Share of all gold medals at the Summer Olympics since 2000 and country share of 2023 world GDP (PPP)
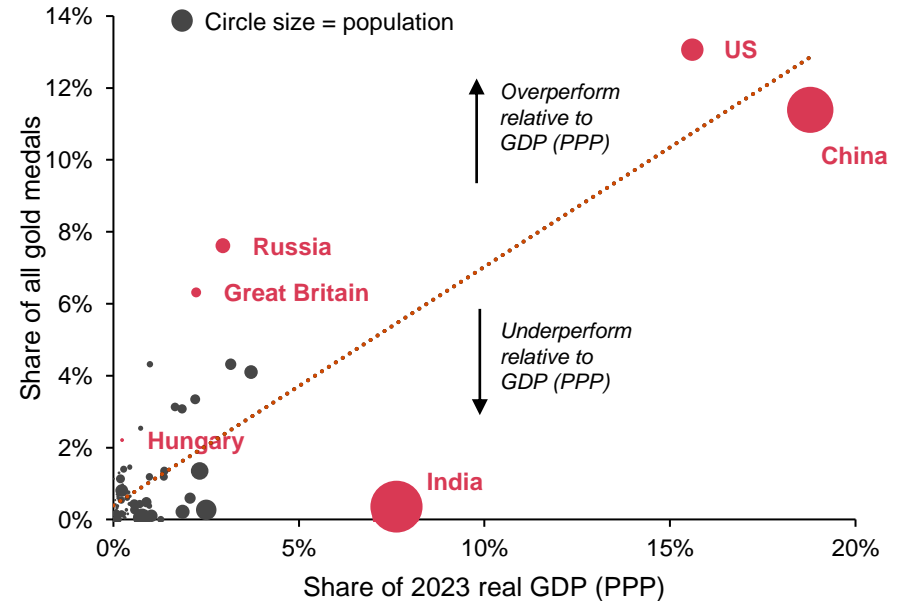
Home nation advantage: good news for France in Paris?

Home nations typically do better in the Olympics

The hypothesis that home countries typically perform better in the Olympics is supported by the data, as Figure 2 shows. However, the magnitude of this effect varies from one Olympic games to the next. This could perhaps be influenced by the maturity of the home country's sporting traditions.
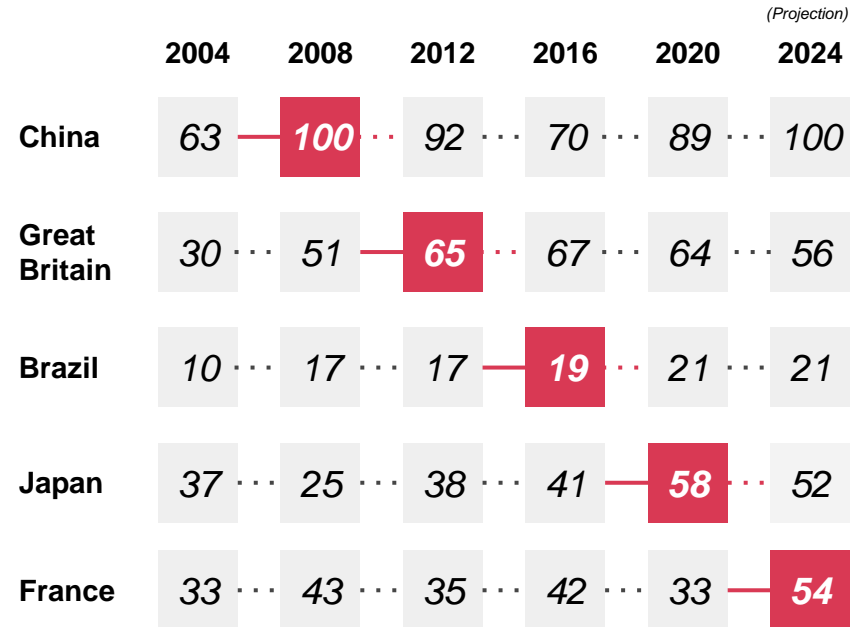
Figure 2 shows that the home nation effect was particularly strong for China in Beijing (where its medal total rose to 100 from 63 in Athens), Great Britain in London (65 medals up from 51 in Beijing) and Japan in Tokyo (where its medal total rose to 58 from 41 in Rio). Likewise in the Sydney 2000 Olympics, Australia performed strongly to win 58 medals, compared to 49 in Athens. But this effect was somewhat less evident in the Rio, where Brazil achieved 19, only increasing their tally by 2 from London.

In addition to this, the explanatory power of the model increases significantly when we include the national medal shares at the previous two Summer Olympic Games. This can be interpreted to reflect the fact that the comparative advantage in sport tends to persist over time.

Accounting for these two important factors, as well as the economic factors outlined on the previous slide, our modelling predicts that France is likely to boost its medal count from 33 at the Tokyo 2020 Olympics to 54 in the Paris 2024 Olympics.

On the following slides, we set out our projections for the 2024 Olympics in full.

Figure 2: Olympic medals won at each event since 2004

(Projection)

	2004	2008	2012	2016	2020	2024
China	63	100	92	70	89	100
Great Britain	30	51	65	67	64	56
Brazil	10	17	17	19	21	21
Japan	37	25	38	41	58	52
France	33	43	35	42	33	54

■ *Host nation*

Sources: IOC, PwC analysis

Our modelling predicts the US will top the medal table, China will take second and Team GB will fend off France for third

The US could top the total medals for the eighth consecutive Summer Olympics, up on Tokyo 2020 Olympics by three medals.

France is expected to more than double its Tokyo gold medal tally, and the anticipated total of 54 medals would represent its best Games in over a century.

India is expected to achieve its best medal haul yet. Our model predicts that they will win six gold medals, which would be a significant leap considering they have won only three in the past 50 years. Could this be the start of a new era for Indian Olympians?

Country	Gold	Silver	Bronze	Total
US	42	43	31	116 *(+3)*
China	42	34	24	100 *(+11)*
Great Britain	20	20	16	56 *(-8)*
France *(Host)*	21	20	13	54 *(+21)*
Japan	23	13	16	52 *(-6)*
Australia	15	8	14	37 *(-9)*
Germany	10	12	14	36 *(-1)*
Italy	9	11	13	33 *(-7)*
Netherlands	8	9	8	25 *(-11)*
Brazil	7	7	7	21 *(0)*
Canada	6	5	9	20 *(-4)*
India	6	7	6	19 *(+12)*
South Korea	6	4	8	18 *(-2)*
New Zealand	6	6	5	17 *(-3)*
Hungary	5	5	5	15 *(-5)*
Spain	4	6	5	15 *(-2)*
Ukraine	1	5	7	13 *(-6)*
Poland	4	4	5	13 *(-1)*
Türkiye	3	4	6	13 *(0)*
Denmark	3	5	4	12 *(+1)*

China is poised to replicate their medal count from the Beijing 2008 Olympics and rival the US in the number of gold medals won.

Team GB is projected to win 20 gold medals, just shy of the 22 golds at the Tokyo 2020 Olympics.

Türkiye could equal their total medal count from Tokyo but reach a new record for gold medals.

Notes: The numbers in brackets represent the difference from the 2020 Tokyo Olympics. Also, we assume a total of 329 medals, comprising gold, silver, and bronze. This is a simplifying assumption, as in some cases there could be shared medals, and certain events, such as Judo, may award multiple bronze medals..

Sources: IMF, IOC, PwC analysis

Box A: India on the up while Russia barred for second consecutive Games

Our modelling shows that India could break their own record at the Paris 2024 Olympics

Our modelling also suggests that India could more than double their medal haul from the 2020 Tokyo Olympics, which would represent a new record. In the past, India has struggled for success at the Summer Olympic Games, taking only 22 medals in the past four decades. However, fortunes have perhaps started to shift. In 2020, India won 7 medals, with Neeraj Chopra winning the first gold medal since the Beijing 2008 Olympics.

India is currently the fifth largest economy in the world, falling just behind Japan. Its Olympic performance has historically underperformed relative to its economic size (see Figure 1). Level of real GDP (PPP) is a key driver in our model and therefore there is a risk that our modelling could overestimate India's performance at the Olympics—

particularly in view of its very fast economic growth rates However, the optimist may say this could be a shift in the tide, with India building on their results from the Tokyo 2020 Olympics.

Significantly fewer Russian athletes for the Paris Games

Following a decision from the International Olympic Committee, both Russian and Belarusian athletes were banned from representing their country at the Paris 2024 Olympics.

Instead, 15 athletes from Russia, have accepted an invitation to compete as 'Individual Neutral Athletes' (AINs). This is significantly less than the 334 who competed in Tokyo, under the Russian Olympic Committee (ROC). As a result, other countries will stand to benefit from this development, particularly those competing in the fields of fencing and gymnastics, where Russian athletes have previously shown sporting dominance.

Technical Appendix

We identify four key drivers of performance at the Olympics and use it to predict the medal haul at the Paris 2024 Olympics

For the Paris 2024 Olympics, we update our modelling from the 2012 London Olympics to project the number of gold, silver and bronze medals by country.

Consistent with our previous analysis, our approach to benchmark national performance at the Summer Olympic Games relies on a linear regression. Our model uses four independent variables to predict the share of medals by country. These variables are:

1. Current real GDP at PPP exchange rates

2. Share of medals won at the previous Summer Olympics (4 years prior)

3. Share of medals won at the Summer Olympics before last (8 years prior)

4. Dummy variable indicating home nation

To predict the gold, silver and bronze medal tally, we run three specifications of the model, one for each type of medal. Our total medal tally is then the sum of the gold, silver and bronze medals for each country.

To test the accuracy of our model, we use it to project the outcome for the Tokyo 2020 Olympics. If our model can reasonably predict the medal haul at previous events, then it should be capable of predicting the outcome of future games.

Overall, our modelling performs strongly, with a correlation coefficient of 0.97, when comparing the predicted medal totals with the actual results. As with any model, there are some exceptions. For example, our model predicted fewer medals for Australia than materialised and more for Germany in the Tokyo 2020 Olympics.

Figure 3: Model estimate for Tokyo 2020 Olympics vs actual results (Total medals)
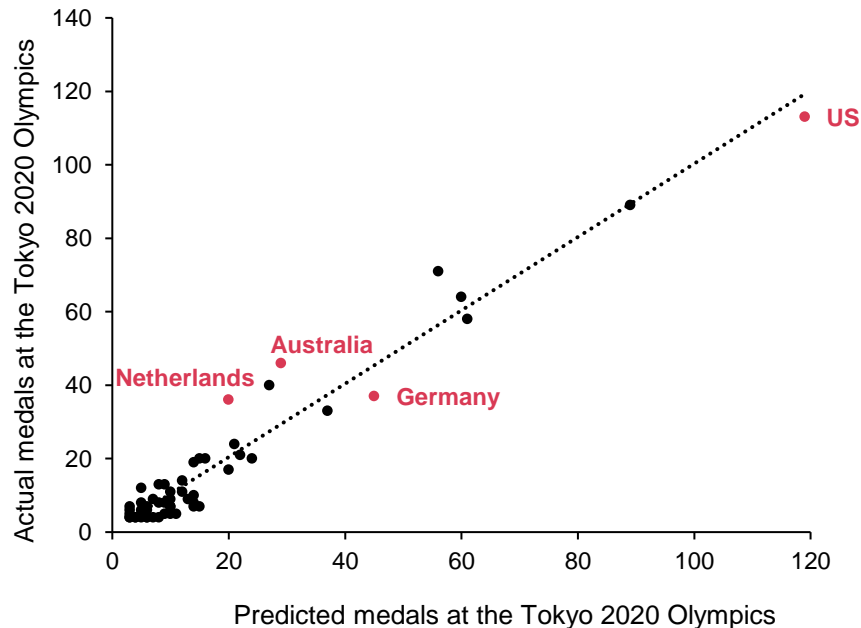
There are other elements that could drive Olympic success

It is not surprising that our model cannot explain all variation in medal shares across countries. This will clearly also be influenced by individual athletic performances, as well as by policy-related factors such as:

- **The level of state and corporate funding** of Olympic athletes in each country (as a % of GDP). Unfortunately, there is no consistent and sufficiently comprehensive data on this, but comparatively high levels of corporate sponsorship may help to explain why the US medal share remains so high.

- **The effectiveness of funding**, which could reflect the extent to which it has been successful in building clusters of genuine world class sporting excellence. This has been the strategy followed by UK Sport, which has led to success in recent Olympic Games.

- **The importance given to athletics and other Olympic sports** where significant numbers of medals are at stake (e.g. swimming, cycling, sailing, shooting, amateur boxing and rowing), as opposed to other sports which are either not represented at the Olympics (e.g. American football and cricket) or fewer medals are at stake (e.g. football and basketball, given that team medals only count as one in the medal tables).

It follows that, if a country's performance at the Olympics differs significantly from what our economic model would predict, this could have some policy implications in relation to the level and effectiveness of sports funding as compared to other countries.

Regression results

The table on the right shows the output of our regressions. Most of our coefficients are statistically significant at the 1% level, with the following exceptions:

1. Host nation effect is not statistically significant for bronze medal results.
2. Medals achieved 8 years prior is not statistically significant for gold medals.

One possible explanation for the initial findings is that hosting the Games pushes top athletes to greater heights but those further down the rankings benefit less.

Perhaps an explanation for the second finding is that sustaining the peak performance required for gold for more than four years is a big ask.

Table 1: Regression output

Dependent Variable: Medal share (%)	Coefficient		
	Gold Medals	Silver Medals	Bronze Medals
Level of real GDP (PPP) ($ trn)	**0.001***	**0.001***	**0.001***
Host nation dummy	**0.032***	**0.018***	**0.006**
Medal share in previous Summer Olympics *(4 years prior)*	**0.727***	**0.435***	**0.497***
Medal share in Summer Olympics one before last *(8 years prior)*	**0.059**	**0.334***	**0.298***
Model fit (Adjusted R-squared)	**0.88**	**0.82**	**0.81**
Standard error of the model	**0.01**	**0.01**	**0.01**
Observations	**288**	**288**	**288**

*statistically significant at 10% level **statistically significant at 5% level *** statistically significant at 1% level

The host nation effect can, in some circumstances, extend to the Olympics before and after hosting

Some research shows that the host nation effect occurs both before and after hosting the Olympics. The hypothesis for this is that countries ramp up investment in both training programmes and sports infrastructure before hosting the Games. As a result, this investment benefits athletes at both the Olympics before the host year and the Olympics after hosting.

To add to this research, we have adjusted our main model to include two extra dummy variables:

1. Host nation dummy for 4 years prior.
2. Host nation dummy for 4 years after.

Our findings are mixed. We find a significant impact on gold and bronze medals before hosting the Summer Olympics and on silver medals after hosting. However, including these variables does not significantly improve the overall model fit.

Table 2: Regression output (investigating host nation effect)

Dependent Variable: Medal share (%)	Coefficient		
	Gold Medals	Silver Medals	Bronze Medals
Level of real GDP (PPP) ($ trn)	0.001***	0.001***	0.001***
Host nation dummy *(Summer Olympics 4 years before hosting)*	0.012***	0.002	0.009**
Host nation dummy	0.032***	0.019***	0.007*
Host nation dummy *(Summer Olympics 4 years after hosting)*	- 0.001	0.011**	-0.002
Medal share in previous Olympics *(4 years prior)*	0.724***	0.404***	0.480***
Medal share in Olympics one before last *(8 years prior)*	0.062	0.354***	0.315***
Model fit (Adjusted R-squared)	0.88	0.82	0.81
Standard error of the model	0.01	0.01	0.01
Observations	288	288	288

*statistically significant at 10% level **statistically significant at 5% level *** statistically significant at 1% level

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