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Predicting Olympic Medal Counts: the Effects of Economic Development on Olympic Performance

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Abstract:

This paper investigates the relationship between a country's Olympic performance and its overall economic condition, including population, economic resources, and political structures. A panel data set comprising the yearly data of 1996, 2000, and 2004 are estimated by using a fixed-effect Tobit regression model. Following previous studies on this topic, population size and economic resources are measured by using population and per capita GDP. One major focus of this research is the influence of political structure on national Olympic performance. Instead of using a socialist and non-socialist dummy variable like most previous studies, I used continuous variables, political freedom (PF) and civil liberty (CL), to estimate the impact of political structure.

Consistent with previous studies on this topic, the regression results indicate that countries with a larger population and more abundant economic resources are more likely to perform better in the Olympic arena. Countries that are politically "Not Free" generally seem to perform better in the Olympics by winning more medals than the rest of the world. One interesting finding is that the results suggest weakly that political freedom variables, both political freedom and civil liberty, display a U-shaped relationship with respect to medal shares. Being "Partly Free", has a negative effect on national Olympic performance as compared to countries that are "Free" and "Not Free".

I. Introduction

The modern Olympics were conceived by their founder Pierre de Coubertin to be a competition between individual athletes, not countries (IOC, 2000). The Olympic Spirit emphasizes participation rather than winning. In reality, however, the success of a country's athletes is held to be an important source of national prestige. By-country medal tables are widely published. A glance at Olympic history will immediately tell us that not all nations have an equal ability to win medals. In this past August, 199 countries participated in the Athens Olympics, and 124 countries did not win a single medal. On the other hand, the top ten winners collectively took home 514 medals, which is more than 50% of the medals available at the Athens Olympics. Therefore, a natural question to ask is why some countries are able to enjoy a great success in the Olympic arena, while some others are unable to do so.

The unequal distribution of Olympic Medal numbers might be explained by the relative strength of countries in different sports. For example, with a large number of high-quality basketball players, the United States should have a higher probability of winning a medal in basketball. We could then generate a prediction for a national medal total by summing across sports. However, this paper takes a different perspective and attempts to predict a nation's Olympic performance by investigating the socioeconomic variables that have a significant influence on a nation's Olympic performance. The influence of population size, economic resources, political structure, and hosting advantage are estimated by using several different models.

The paper is organized in the following structure. Section II introduces the theoretical framework of the research and reviews previous literature related to this topic. The empirical model and data used to test the research hypothesis are described in detail in Section III. Section IV presents the regression results. Finally, Section V concludes the research by discussing avenues for future research.

II. Theoretical Framework and Review of Literatures

Starting with the post-World War II games, sociologists and economists began to analyze the impact of social and economic conditions on the number of Olympic medals won by different countries. Examples of those studies are Ball (1972), Grimes et al. (1974) and Levine (1974). Those early studies showed that population, income per capita, hosting advantage, and political system have significant impacts on a nation's medal counts. First, population is one the fundamental determinants of Olympic success. A big population increases the group of potential athletes. As we can see, China wins more medals than most other nations, because having 1.3 billion people improves the odds of producing a Yao Ming. The second determinant is economic resources. Richer countries can usually afford to train athletes better, to provide better medical care, and to send a larger group of athletes to the Olympic Games. Hosting advantage is also significant. The hosting country is allowed to participate in all events. In addition, the crowd of home spectators will support the performing athletes. The fourth determinant is political and economic structure. There is a large amount of evidence suggesting that communist countries perform better. This is probably because a central-planned economic system allows more specialization in sports, and more resources can be distributed to training and supporting athletes than in market-based economies. Moreover, the governments of communist countries not only have a greater capability to channel economic resources to sports, but also have a stronger incentive to do so. Because Olympic performances are so closely connected with national prestige, winning a large number of Olympic medals can definitely help them obtain recognition internationally as well as stimulate patriotism domestically. Without having a democratic political system, international recognition and patriotism are extremely valuable to the government for maintaining political stability.

Surprisingly enough, the literature that models Olympic performance did not resume until the 1990's. An explanation of this might be that in the 1970's and 1980's the Olympic Games were disturbed by the Cold War. The first study that restarts the performance analysis is Slughart et al (1993), which analyzes the Olympic performance of transitional economies. Recently, two studies by Johnson and Ali (2000) and Bernard and Busse (2000) revived attention on this issue. Johnson and Ali (2000) assume the medal counts to be a linear function of GDP per capita, population, and two dummy variables indicating hosting country and political system respectively. They find that the home advantage adds a 12 percent chance of success, and communist countries outperform the others by 12 medals (5 gold medals).

Bernard and Busse (2000) estimate Tobit models for medal shares using data since 1960. They specify a Cobb-Douglas production function for national Olympic talent, using population and economic resources (measured in GDP) as production factors. By specifying a Cobb-Douglas production function form, Bernard and Busse assume that both population share and economic resources should be subject to diminishing marginal returns. This assumption does make economic sense. Holding economic resources constant, additional talented athletes will inevitably decrease the funds available to each person, and some athletes might not be able to obtain the training conditions that are necessary for them to fully reach their potential. Therefore, the marginal contribution of population share to the Olympic medal winning process tends to decline as the population size gets bigger. Conversely, holding population constant, additional economic resources allocated to sports should also yield diminishing returns as more athletes attain their potential. As we move down the list of athletes, we encounter less-talented athletes. Spending economic resources in training those average athletes will not produce any Olympic medals. In an extreme case, once all the talented athletes who are capable of competing for Olympic medals in a country reach their physical limits by having ideal training conditions, additional funding would not increase the country's Olympic medal share at all. In addition, Bernard and Busse also include a dummy variable for the hosting advantage, a soviet dummy, and a non-soviet but planned economy dummy. The hosting advantage is estimated to be 1.2 percentage point medal share. The effect of the soviet dummy varies between 3-6 percentage points.

Some of the most recent studies go beyond medal counts and argue that not all Olympic medals are alike, and countries with different characteristics specialize in different sports. Tcha and Pershin (2003) investigate each country's performance and attempt to identify the determinants of this performance in each sport, and also examine other issues related to specialization at these games, using the concept of revealed comparative advantage (RCA). Each country's RCA is explained by geographical, biological, and economic variables of the participating countries. The analyses present the determinants of each country's specialization in sports and the patterns of RCA, which are substantially different from those obtained by analyzing the medal total. The authors found that high-income countries specialize less; in other words, they win medals in a more diversified range of sports.

This paper will follow the most recent studies on modeling national Olympic performance and will investigate the relationship between a country's Olympic performance and its overall socioeconomic condition, including population, economic resources, and political structures. A panel data set comprising the yearly data of 1996, 2000, and 2004 are estimated by using the fixed-effect Tobit regression model. The reason for using the Tobit model is that the majority of participating countries usually do not win any medals, and this fact causes the existence of a large number of zero values in my data.

A different approach from previous studies is that instead of using a single dummy variable (socialist or non-socialist), two continuous variables, (political freedom and civil liberty), are used in this research. There are three reasons for this change. First, although most socialist countries are not politically free, the incentives for using good Olympic performance to stimulate nationalism are not limited to socialist countries. Many other capitalist countries with relatively low levels of political freedom can also take advantage of this effect. Second, using continuous variables not only distinguishes countries that are extremely not free from others, but also reveals the impact of political freedom on countries with moderate levels of political freedom. Third, the level of political freedom varies over time. A nation's rating might change drastically during a four-year period. Hence, continuous variables will function better than a dummy variable in capturing the impact of the changes on political freedom variables. Based on the results of previous studies, I expect population size and economic resources to be positively correlated with a country's medal share, and being a country with a low level of political freedom or being a hosting country increases a country's medal share.

III. Empirical Model and Data

In this paper, I follow the empirical model constructed by Bernard and Busse (2000), which uses a Cobb-Douglas production function for producing Olympic talents. It assumes that producing Olympic talent (T) is intrinsically similar to the process of producing other goods and services, and the two key inputs are population size (N) and economic resources (Y), which are both subject to diminishing marginal return. Hence, the medal winning process can be modeled in the following way:

$$T_{it} = N_{it}^{\gamma}\, Y_{it}^{\theta}\, A_{it} \tag{1}$$

where T is Olympic talent, N is population, Y is GDP, and A is organizational ability of a particular country. The subscript i denotes a particular country, and the subscript t denotes a particular year. For example T_{it} represents the aggregate quantity of Olympic talent of country i in year t. Obviously, we also have to assume that year t is one of the years in which the Olympics were held. Medal share (M_{it}) is calculated by dividing the medal count of country i at year t by the total number of medals available in that year. We assume that M_{it} is a function of the Olympic talent within that country in that year; that is, $M_{it} = g(T_{it})$. Guided by the research by Bernard and Busse (2001), I use a log function for the translation from relative Olympic talent to medal shares:

$$M_{it} = \ln(T_{it} / \Sigma_j T_{jt}) \qquad (2)$$

Equation (2) assumes the medal share (M_{it}) equals the natural log of the Olympic talent share ($T_{it} / \Sigma_j T_{jt}$), which is a fraction of the Olympic talent of country i over the sum of Olympic talents of all participating countries at the year t. In Bernard and Busse's research, both the linear (without the natural log) and the logarithmic functional are been tried in order to find a better fit. It turns out that the logarithmic functional form does a much better job than the linear one.

By substituting T_{it} in equation (2) with $N_{it}^{\gamma}\ Y_{it}^{\theta}\ A_{it}$, we obtain the following specification for medal shares:

$$M_{it} = \gamma \ln N_{it} + \theta \ln Y_{it} + \ln A_{it} - \Sigma_j T_{jt} \qquad (3)$$

Because national income can be rewritten as the product of population and per capita GDP, I will actually estimate the following equation:

$$M_{it} = C + \beta_1 \ln N_{it} + \beta_2 \ln(Y/N)_{it} + \beta_3 \, Host_{it} + \beta_4 \, PSV_{it} + \beta_{4i} \, d_i + \beta_{5t} v_t + e_{it} \qquad (4)$$

where β_1 equals $(\gamma+\theta)$, and β_2 equals θ. Because, A_{it} is organizational ability of country i in year t, it is a function of all other variables except N_{it} and $(Y/N)_{it}$. In this paper, since I am interested explicitly in the impacts of hosting advantage and political structure on national Olympic performance, A_{it} can be represented by $Host_{it}$, PSV_{it}, and sets of dummy variables for country (d_i) and year (v_t) to capture other differences among countries and years. Notice that $\Sigma_j T_{jt}$ is no longer in the equation, because $\Sigma_j T_{jt}$ is the same for all participating countries in a particular year, and its impact will be captured by the year dummy variables (v_t). Finally e_{it} is the statistical error term.

Data used for this research are from three sources. Yearly data of Olympic medal counts and information on hosting countries are obtained by direct correspondence with the International Olympic Committee (IOE). I do not distinguish between gold, silver, and bronze medals, because the difference between the best and the second best is usually so tiny that the rank of medalists depends more on luck rather than sport talents. The data on population (measured in million people) and per capita GDP (measured in PPP 2004 international dollars) are extracted from the World Development Report (World Bank, 2004).

The political structure variables are extracted from Freedom House, a non-governmental, non-profit organization founded sixty years ago. Every year, Freedom House publishes "Freedom in the World," an annual report of the political rights and civil liberties in countries and territories around the world. In this report, each country is evaluated based on a checklist of questions evaluating political rights and civil liberties. According to Freedom House's definitions,

> Political rights enable people to participate freely in the political process, including the right to vote, compete for public office, and elect representatives who have a decisive impact on public policies and are accountable to the electorate. Civil liberties allow for the freedoms of expression and belief, associational and organizational rights, rule of law, and personal autonomy without interference from the state.
> (Freedom House)

Based on the survey results, each country is given ratings for political rights and civil liberties respectively based on a scale of 1 to 7, with 1 representing the highest degree of freedom present and 7 the lowest. The average of each country's political rights and civil

<table>
<tr><th colspan="4">Table 1: Definitions of Key Variables and Hypothesized Signs</th></tr>
<tr><th colspan="2">Dependent Variable:</th><th>Definitions:</th><th>Hypothesized Sign</th></tr>
<tr><td colspan="2">Medal Share (M)</td><td>The number of medals won by a country as the share of total medals available at a particular Olympic Game</td><td>n/a</td></tr>
<tr><th colspan="4">Independent Variables:</th></tr>
<tr><td colspan="2">Population (N)</td><td>The population size of a country (measured in million people)</td><td>+</td></tr>
<tr><td colspan="2">GDP per capita (Y/N)</td><td>The per capita GDP of a country (measured in PPP 2004 international dollars)</td><td>+</td></tr>
<tr><td rowspan="3">Political Structures (PSV)</td><td>Political Rights (PR)</td><td>the rating of political rights (from 1 to 7)</td><td>+</td></tr>
<tr><td>Civil Liberties (CL)</td><td>the rating of civil liberties (from 1 to 7)</td><td>+</td></tr>
<tr><td>Overall Status (OS)</td><td>A set of 3 dummy variables (0 and 1) representing "Not Free", "Partly Free", and "Not Free" respectively</td><td>n/a</td></tr>
<tr><td colspan="2" rowspan="2">Hosting Country (Host)</td><td>1 if the country is the hosting country of the</td><td rowspan="2">+</td></tr>
<tr><td>0 otherwise</td></tr>
</table>

liberties ratings are used to determine the country's "overall status" of political freedom. "Those whose ratings average 1.0-2.5 are considered Free, 3.0-5.0 Partly

Free, and 5.5-7.0 Not Free. (Freedom House) In this paper, the rating of political rights (PR), the rating of civil liberties (CL), and the overall status (OS) are used separately in equation (4) as PSV to find the best fit. I do not put more than one PSV variable into the equation because of multicollinearity between these three variables. Table 1 gives the definition of each variable used.

I use data from the last three Olympics (1996, 2000, and 2004). I do not include Olympics before 1996 because Olympic performances in many of those games were twisted by non-socioeconomic factors. For example, due to the Cold War, the United States did not attend the Moscow Olympics in 1980. Also along with many other socialist countries, the Soviet Union boycotted the Los Angeles Olympics in 1984. Moreover, the collapse of the Soviet Union in 1989 also significantly distorted the performance of former Soviet countries.

It is reasonable to assume that a period of time is necessary for the impact of population, economic resource, and other socioeconomic variables to be fully realized, because training first-rate athletes takes time. Data with a lag of 2 years and 3 years are used to reflect this "time-to-build" effect. Descriptive statistics of the data used for this research are provided in Table 2.

Table 2: Descriptive Statistics of Key Variables						
Variables		Observations	Mean	Std. Dev	Min	Max
Medal Shares (M)	M_t	600	0.5029167	1.401269	0	12.04
Population (N)	N_{t-2}	570	30,765	118,032	17	1,280,400
	N_{t-3}	569	30,415	116,714	16	1,271,850
GDP per capita (Y/N)	$(Y/N)_{t-2}$	483	246,206	856,826	317	10,300,000
	$(Y/N)_{t-3}$	487	234,130	811,872	300	9,912,139
Political Rights (PL)	PR_{t-2}	555	3.466667	2.193745	1	7
	PR_{t-3}	554	3.519856	2.226051	1	7
Civil Liberties (CL)	CL_{t-2}	555	3.594595	1.837134	1	7
	CL_{t-3}	554	3.680505	1.844031	1	7
Overall Status (OS)	Descriptive statistics omitted, because OS are dummy variables.					
Hosting Country (Host)	Descriptive statistics omitted, because Host is a dummy variable.					

Note: the subscripts denote the lag. For example Nt-2 denotes population with a lag of two years

IV. Results

Fixed-effect Tobit regressions are applied to estimate equation 4, and the rating of political rights (PR), the rating of civil liberty, and the overall status have been plugged into the equation as political freedom variables. The regression results for the models with a lag of three years are shown in Table 3, and the regression results for the models with a lag of two years, which are essentially the same, are shown in Appendix 1. As we can see from Table 3, population, per capita GDP, and hosting advantage show highly significant, positive influences on national Olympic performance. Moreover, the coefficients of these three variables are very stable across different model. These results are consistent with previous research.

Also, as previous studies have revealed, countries that are politically "Not Free" may perform somewhat better in the Olympics by winning more medals than the rest of the world, though the difference between "Free" and "Not Free" is not significant. However, an interesting finding is that the overall status displays a U-shaped relationship with respect to medal shares. Being "Partly Free", has a negative effect on national Olympic performance when compared to countries that are "Free" and "Not Free". As we can see, the coefficient of "Partly Free" is negative and reasonably significant. To further test this relationship, I replace the "Not Free", "Partly Free" dummies with political rights (model 2) and civil liberties (model 3). In each case, the addition of the square seems to improve the fit slightly, with the signs – positive for the variable and negative for its square – suggesting a U-shaped curve.

Table 3: Regression Results of Equation 4 (with a lag of three years)

Variables	Model 1	Model 2-a	Model 2-b	Model 3-a	Model 3-b
ln(Population)	0.4343	0.4244	0.4211	0.425	0.4249
	(12.54)***	(11.52)***	(11.42)***	(11.54)***	(11.54)***
ln(Per capita GDP)	0.4308	0.3906	0.3895	0.3932	0.3932
	(7.63)***	(6.41)***	(6.40)***	(6.44)***	(6.44)***
Hosting (dummy)	2.1542	2.5753	2.5663	2.5623	2.5553
	(5.07)***	(5.25)***	(5.24)***	(5.22)***	(5.20)***
Not Free (dummy)	0.022				
	(0.19)				
Partly Free (dummy)	-0.1841				
	(-1.70)**				
Political Rights		0.0143	-0.1298		
		(0.66)	(-1.17)*		
$(\text{Political Rights})^2$			0.0185		
			(1.33)*		
Civil Liberty				0.0235	-0.0143
				(0.92)*	(-0.12)
$(\text{Civil Liberty})^2$					0.0049
					(0.33)
Log Likelihood	-564.6722	-519.7435	-518.8667	-519.5382	-519.4826

Note: Z-values are in the parenthesis. ***Significant at 0.05 level, **Significant at 0.1 level, *Significant at 0.5 level.

Again, some of the coefficients or PSVs are not strictly significant. Still, it is quite striking to see the consistency across different models. The results consistently suggest a U-shaped relationship between PFV and Olympic performance.

One possible explanation of this U-shaped relationship might be that, for nations that have a high to medium level of political freedom, its citizens usually have a pretty high level of satisfaction with their political rights and civil liberty. Being already quite proud of their homeland, the effect of a good Olympic performance in stimulating nationalism becomes almost irrelevant. However, for nations which have a less free political structure, a good Olympic performance functions almost like steroids, which could tremendously enhance national prestige and enable its citizens to feel extremely proud of their home country in the short-run.

To test the accuracy of my model, I calculate the predicted medal winning of each country at the Athens Olympics. The predicted medal counts and the actual numbers are listed in Appendix 2 for comparison. The predicted values are computed based on Model 1 with a lag of 3 years. I used the Overall Status (OS) as my PFV simply because it yields better results than the others. For the most part, the model does a reasonably good job on predicting national Olympic performance. One measure is the standard error of the forecast.

$$S_f = \sqrt{\frac{\sum_{it}(X_{it}^{a} - X_{it}^{f})^2}{n-k}} = 3.2018$$

This means the predicted values are on average off by 3.20 medals from the actual values.

In fact, the model does a better job than this measure suggests. The inaccuracy is largely due to the existence of outliers, e.g. Cuba and Russia, for which the predicted values are off by more than 20 medals. Generally, former Soviet countries and socialist countries are systematically under-predicted. This shortcoming probably has to do with my choice of using the political freedom index, which captures the incentive for a nation to use a good Olympic performance to stimulate patriotism and enhance domestic political stability. However, this is only one side of the story. By having a powerful national government, which governs the central-planned economy, former Soviet countries and many other socialist countries may be more capable in channeling funds to support sports than other nations with a low political freedom index but a relatively weak government. In other words, although countries that are politically not free have incentives to boost their Olympic performance, not all of their national governments have the same ability to achieve the goal like the powerful governments of many socialist countries do.

In addition, many former Soviet countries have undergone a significant change of political structure. Many of them, e.g. Russia and Ukraine, have shifted from "Not Free" to "Partly Free." However, the infrastructures and facilities established during the Soviet period still exist and continue to bring medals to those countries. In fact, many excellent athletes, trained during the Soviet period, are still competing in the Olympic arena for their home countries, and that also contributes to the higher number of Olympic medals won by former Soviet countries than my model's prediction.

V. Conclusion

Consistent with previous studies on national Olympic performance, this paper finds that socioeconomic variables, including population, economic resources, and hosting advantage, have significant impact on a country's Olympic performance. In general, population and economic resources (per capita GDP) are positively correlated with medal counts. The larger the population size, the more likely a country is to do better in Olympics; the richer a country is, the more Olympic medals it will likely win. Being a hosting nation also has a favorable influence on a country's Olympic performance. In general, my results are consistent with those of the studies carried out by Johnson and Ali (2000) and Bernard and Busse (2000). Most influential factors identified by those previous studies are verified to be statistically significant. One interesting finding of my research is that the regression results, though somewhat weakly, suggest that political freedom variables, both political freedom and civil liberty, display a U-shaped relationship with respect to medal shares. Being "Partly Free", has a negative effect on national Olympic performance when compared to countries that are "Free" and "Not Free". Avenues for future research include verifying this U-shaped relationship, and testing possible explanations.

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Appendix 1:

Regression Results of Equation 4 (with a lag of 2 years)						
Variables	**Model 1**	**Model 2-a**	**Model 2-b**	**Model 3-a**	**Model 3-b**
ln(Population)	0.4590	0.4261	0.4227	0.4261	0.4255
	(13.77)***	(11.5)***	(11.39)***	(11.51)***	(11.49)***
ln(Per capita GDP)	0.4737	0.4016	0.4001	0.4035	0.4028
	(6.14)***	(6.5)***	(6.48)***	(6.53)***	(6.52)***
Hosting (dummy)	2.4095	2.5599	2.5388	2.5472	2.5340
	(3.46)***	(5.2)***	(5.16)***	(5.18)***	(5.15)***
Not Free (dummy)	0.2137				
	(0.98)*				
Partly Free (dummy)	-0.3022				
	(-1.4)*				
Political Rights		0.0142	-0.1161		
		(0.66)	(-1.02)*		
(Political Rights)2			0.0167		
			(1.16)*		
Civil Liberty				0.0243	-0.0496
				(0.96)*	(-0.43)
(Civil Liberty)2					0.0095
					(0.66)
Log Likelihood	-584.7872	-517.2418	-516.5644	-516.9995	-516.7816

Note: Z-values are in the parenthesis. ***Significant at 0.05 level, **Significant at 0.1 level, *Significant at 0.5 level.

Appendix 1:

Free			Partly Free			Not Free		
Countries	Actual	Predicted	Countries	Actual	Predicted	Countries	Actual	Predicted
American Samoa	0	0	Albania	0	0	Afghanistan	0	0
Andorra	0	0	Antigua and Barbuda	0	0	Algeria	0	0
Argentina	6	0	Armenia	0	0	Angola	0	0
Aruba	0	0	Bahrain	0	0	Azerbaijan	5	0
Australia	49	50	Bangladesh	0	0	Belarus	15	20
Austria	7	14	Bolivia	0	0	Bhutan	0	0
Barbados	0	0	Bosnia and Herzegovina	0	0	Brunei	0	0
Belgium	3	0	Burkina Faso	0	0	Cambodia	0	0
Belize	0	0	Burundi	0	0	Cameroon	1	0
Benin	0	0	Colombia	1	0	Cayman Islands	0	0
Bermuda	0	0	Comoros	0	0	Central African Republic	0	0
Botswana	0	0	Congo, Democratic Republic of the	0	0	Chad	0	0
Brazil	10	13	Djibouti	0	0	China	63	64
British Virgin Islands	0	0	Ecuador	0	0	Congo, Republic of the	0	0
Bulgaria	12	16	Ethiopia	7	11	Cote d'Ivoire	0	0
Canada	12	18	Fiji	0	0	Cuba	27	0
Cape Verde	0	0	Gabon	0	0	Egypt	5	0
Chile	3	0	Georgia	4	0	Equatorial Guinea	0	0
Cook Islands	0	0	Guatemala	0	0	Eritrea	1	0
Costa Rica	0	0	Guinea-Bissau	0	0	Guam	0	0
Croatia	5	0	Honduras	0	0	Guinea	0	0
Cyprus	0	0	Indonesia	4	0	Haiti	0	0
Czech Republic	8	12	Jordan	0	0	Iran	6	0
Denmark	8	10	Kenya	7	12	Iraq	0	0
Dominica	0	0	Kuwait	0	0	Kazakhstan	8	0
Dominican Republic	1	0	Macedonia	0	0	Korea, North	5	0
El Salvador	0	0	Madagascar	0	0	Kyrgyzstan	0	0
Estonia	3	0	Malawi	0	0	Laos	0	0
Finland	2	0	Malaysia	0	0	Lebanon	0	0
France	33	38	Moldova	0	0	Liberia	0	0
Germany	48	60	Morocco	3	0	Libya	0	0
Ghana	0	0	Mozambique	0	0	Maldives	0	0
Greece	16	27	Nepal	0	0	Mauritania	0	0
Grenada	0	0	Nicaragua	0	0	Netherlands Antilles	0	0
Guyana	0	0	Niger	0	17	Oman	0	0
Hong Kong	1	0	Nigeria	2	0	Pakistan	0	0
Hungary	18	22	Papua New Guinea	0	0	Palestine	0	0
Iceland	0	0	Paraguay	1	0	Qatar	0	0
India	1	0	Russia	91	69	Rwanda	0	0
Ireland	1	0	Seychelles	0	0	Saudi Arabia	0	26
Israel	2	0	Sierra Leone	0	0	Somalia	0	0
Italy	33	33	Singapore	0	0	Sudan	0	0
Jamaica	5	0	Solomon Islands	0	0	Swaziland	0	0
Japan	37	26	Sri Lanka	0	0	Syria	1	0
Korea, South	30	30	Tanzania	0	0	Tajikistan	0	0
Latvia	4	0	The Gambia	0	0	Togo	0	0
Lesotho	0	0	Tonga	0	0	Tunisia	0	0
Liechtenstein	0	0	Trinidad and Tobago	1	0	Turkmenistan	0	0
Lithuania	3	0	Turkey	10	19	United Arab Emirates	1	0
Luxembourg	0	0	Uganda	0	0	Uzbekistan	5	0
Mali	0	0	Ukraine	23	16	Vietnam	0	0
Malta	0	0	Venezuela	2	0	Yugoslavia	0	0
Mauritius	0	0	Yemen	0	0	Zimbabwe	3	0
Mexico	4	10	Zambia	2	0			
Micronesia, Federated States of	0	0						
Monaco	0	0						
Mongolia	1	0						
Myanmar (Burma)	0	0						
Namibia	0	0						
Nauru	0	0						
Netherlands	22	24						
New Zealand	5	0						

Free			Partly Free			Not Free		
Countries	Actual	Predicted	Countries	Actual	Predicted	Countries	Actual	Predicted
Norway	6	10						
Palau	0	0						
Panama	0	0						
Peru	0	0						
Philippines	0	0						
Poland	10	16						
Portugal	3	0						
Puerto Rico	0	0						
Romania	19	18						
Saint Kitts and Nevis	0	0						
Saint Lucia	0	0						
Saint Vincent and the Grenadine:	0	0						
Samoa	0	0						
San Marino	0	0						
Sao Tome and Principe	0	0						
Senegal	0	0						
Slovakia	6	0						
Slovenia	4	0						
South Africa	6	10						
Spain	19	13						
Suriname	0	0						
Sweden	7	11						
Switzerland	5	0						
Taiwan	5	0						
Thailand	8	0						
The Bahamas	2	0						
United Kingdom	29	28						
United States	103	87						
Uruguay	0	11						
Vanuatu	0	0						
Virgin Islands	0	0						