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Why Countries Differ Greatly in the Effects of COVID-19

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ABSTRACT

In some studies, the fall in GDP in the context of the COVID-19 pandemic is seen as a kind of payment for the reduction in mortality from this virus. This interpretation of the relationship between changes in GDP and the number of COVID-19 deaths per 100,000 population is one explanation for the differences in mortality rates between countries. The article examines the validity of this interpretation of the fall in GDP of many countries in 2020. In addition, several other characteristics of different countries are involved in the scope of their comparison by the effects of COVID-19: Ranking of happiness, Health spending as percent of GDP, Government Response Stringency Index. As the regression analysis shows, the circumstances included in the review do not fully, but to a large extent, explain the differences between countries in the mortality rate from COVID-19. In contrast to the estimates available in the literature, a weak relationship between the unequal distribution of income in a country and its mortality rate from COVID-19 is shown. The research is based on statistics from thirty countries. The forecast estimates of changes in their GDP, updated by the World Bank in January 2021, are used. The general conclusion of the article is that a strong fall in GDP and high mortality from COVID-19 are the result of a number of countries ' unwillingness to face large-scale challenges that disrupt the usual course of events. This situation is very alarming, since the industrial revolution is also one of these challenges.

INTRODUCTION

The COVID-19 pandemic has sparked a flood of research spanning a wide range of knowledge and activities, from medicine to the industrial revolution. The analysis of the consequences of the pandemic and the factors influencing them occupies a large place in these studies. In the economic literature, considerable attention is paid to the impact of COVID-19 on employment, investment, the stock market, and GDP in different countries. A number of issues that arise in such an analysis remain open or debatable. For example, the difference of opinion on whether Covid-19 accelerates or slows down the transition to the digital economy can be noted. However, the situation that is formed in different countries under the influence of this coronovirus is very different. Many publications focus on such differences.

A particularly tragic consequence of the pandemic is the numerous human casualties. The mortality rate from COVID-19 refers to the consequences for which differences between countries have been the subject of a number of studies. The question of the factors of the mortality rate from COVID-19 remains debatable. The range of reasons considered is very wide, including institutional, cultural, socio-demographic, structural, and natural factors. Much attention is paid to the severity of restrictive measures designed to stop the spread of infection. The downside of these measures is a decline in GDP growth. Slowing economic growth is seen as a price to pay for saving human lives (Balmford et al., 2020). This approach, if it is correct, allows us to give an economic assessment of human life. However, the calculations presented in (Balmford et al., 2020) show very large discrepancies in these estimates for countries with similar levels of economic development.

The results with which some countries ended 2020 cast doubt on whether a high mortality rate from COVID-19 is inevitable when trying to maintain positive economic growth. Thus, the growth rate of the Turkish economy in 2020 is estimated at 1.2%, with a relatively low mortality rate from COVID-19.

Therefore, it is necessary to re-examine the relationship between the mortality rate from COVID-19 in different countries and the decline in their GDP growth rates. The objectives of this article are not limited to this task, but include an assessment of the impact of several other factors on the mortality rates from the pandemic. In particular, the relationship between the Gini index and the coronovirus mortality rate has already been analyzed. It is advisable to refine the available estimates based on more up-to-date data.

The following section provides an overview of the literature on the differences between countries in the impact of COVID-19. After that, the methodology of the study and its statistical base are explained. A separate section is devoted to the analysis of statistical data. The conclusion summarizes the analysis.

1. LITERATURE REVIEW

As noted in (Sung, Kaplan, 2020) "the observation that infected people in the U.S. are 60 times more likely to die compared to Singapore is too serious to ignore". One explanation for the dramatic differences in mortality rates relates them to the intensity of testing for COVID-19 and the peculiarities of registering deaths from this virus. While in some countries, the list of victims of COVID-19 was replenished only if a positive test result for the virus was found, in others, all deaths in which the doctor suspects the coronavirus are taken into account (Morris, Reuben, 2020; Henriques, 2020).

Some studies compare countries based on the CFR (Case Fatality Rate) indicator, which is defined as the ratio between the number of deaths from COVID-19 and the number of confirmed cases of this virus (Sorci et al., 2020). It is easy to imagine that the intensity of population testing for COVID-19 will affect the value of the CFR indicator. In mass population testing, people with mild forms of the disease and without any symptoms will be included in the CFR indicator. As a result, estimates of the mortality rate may be lower than estimates in countries with limited testing scales. The negative relationship between COVID-19 mortality and the number of COVID-19 tests per 100 people was confirmed in (Liang et al., 2020). It also shows that the negative association between COVID-19 mortality and the number of tests is more pronounced among low-income countries.

A different result was obtained in (Sorci et al., 2020), where a comparison of CFR indicators and data on the number of tests performed per 1000 people did not reveal a clear relationship between the mass screening and the level of CFR. According to (Sorci et al., 2020), this suggests that differences in population screening are not enough to explain the huge differences in mortality rates between countries.

In a number of publications, differences in mortality from COVID-19 are associated with demographic circumstances, with the gender and age structure of the population, and with population density (Gerritse, 2020). Statistics show that men and the elderly are less likely to cope with the virus. Accordingly, other things being equal, countries with younger populations and with a higher proportion of women will have lower mortality rates. The same applies to countries where a larger percentage of the population lives in rural areas (Morris and Reuben, 2020).

An interesting observation concerning tropical countries is presented in (Rosario et al., 2020). Based on a study of the situation in Brazil, it is claimed that high solar radiation can be indicated as the main climatic factor that suppresses the spread of COVID-19. An analysis of the impact of economic factors on COVID-19 mortality provides unexpected results. On the one hand, a negative relationship was found between the number of hospital beds per 1000 residents and the CFR. On the other hand, CFR indicators were the highest in the countries leading in terms of GDP per capita and in terms of the share of total health expenditure in GDP. Based on these results, the researchers conclude that the relationship between health care investment and CFR is more complex than might be expected (Sorci et al., 2020).

Much attention is drawn to the institutional circumstances of the development of the pandemic. These circumstances include both the strictness of state measures to restrict contacts between people, and cultural traditions in the implementation of state regulations. The lockdown, one of the social isolation restrictions, has been observed to prevent the COVID-19 pandemic, and showed that the spread of the virus can be significantly reduced by this preventive restriction in (Atalan, 2020). It is noted that strong social distancing measures and generous income support programs help to lower the cases and deaths particularly in countries with poor socio-economic conditions (Ashraf, 2020). In (Brauner et al., 2021), estimates of individual state actions to contain the spread of infection are obtained. The closure of schools and universities is highlighted as a very effective measure. The effect of suspending restaurants, bars, and nightclubs received a lower estimate in terms of COVID-19 mortality. The study did not reveal a positive impact of the closure of preschool institutions and kindergartens.

The socio-economic factors of mortality from COVID-19 include the distribution of income in society. The study (Chaudhry et al., 2020) concludes that lower income variance within a country corresponds to lower mortality. However, countries with higher GDP per capita also had a higher number of deaths per million people. The authors attribute this situation to the high quality of epidemic surveillance, the higher availability and popularity of travel.

2. DATA AND METHODOLOGY

The proportion of deaths among the detected number of patients with COVID-19 can give a distorted picture of the quality of treatment of patients, about the capabilities of the country's health system. As already noted, CFR estimates may overestimate actual mortality if the actual number of infected people is much higher than the number of established cases of infection with the virus. However, the mortality rate from a pandemic depends not only on the state of the health system, but also on other factors, including state anti-epidemic measures. Therefore, the results of all such factors should be taken into account when analyzing the differences between countries in the mortality rate from COVID-19. The indicator of the number of deaths from COVID-19 per 100 thousand inhabitants is more suitable for assessing this impact. The relevant information in a convenient form for analysis is presented on the website https://www.worldometers.info/coronavirus/.

A more complicated situation still remains with respect to the data on growth (decline) GDP of different countries in 2020. So far, we have to use forward-looking estimates of this dynamics. For a wide range of countries, they are listed in the World Economic Outlook, October 2020 (IMF, 2020). Updated forward-looking estimates for 30 countries are contained in (IMF, 2021, Table "Selected Economies Real GDP Growth"). In the next section of the article, estimates of the relationship between the COVID-19 mortality rate and a number of circumstances are analyzed for this group of countries.

The range of circumstances under consideration includes, in particular, the happiness index of individual countries. This index has not previously been considered among the factors associated with COVID-19 mortality. The source of information on the happiness index is the World Happiness Report 2020 (Helliwell et al., 2020). For the Gini index, the estimates of the World Bank are taken (https://data.worldbank.org/indicator/SI.POV.GINI/). Data on health spending as percent of GDP for 2018 is obtained from the website TheGlobalEconomy.com.

The article attempts to correlate the measures of the state response to COVID-19 and the mortality rates from this virus. The Government Response Stringency Index (OxCGRT) is used as a measure of this

response. Index OxCGRT collects publicly available information on 19 indicators of government responses (Hale, 2020). The index values for different countries are available on the Blavatnik School of Government homepage (https://www.bsg.ox.ac.uk/). The stringency of government measures at a time of high intensity of the spread of the virus deserves priority attention. Therefore, the values of the OxCGRT index as of May 1, 2020 are selected for analysis and included in Table 1.

Table 1. Statistical data for 30 countries

Country	Per Capita income	GDP change in 2020	Mortality from COVID-19	Happiness Index	Gini Index	Health spending as percent of GDP	OxCGRT
Argentina	22064	–10,4	113,11	5,98	41,4	9,62	88,89
Australia	49854	–2,9	3,64	7,22	34,4	9,28	69,44
Brazil	14652	–4,5	114,47	6,38	53,9	9,51	77,31
Canada	49031	–5,5	57,47	7,23	33,3	10,79	72,69
China	16117	2,3	0,35	5,12	38,5	5,35	56,94
Egypt	11763	3,6	10,21	4,15	31,5	4,95	84,26
France	46184	–9,0	122,97	6,66	31,6	11	87,96
Germany	53919	–5,4	78,73	7,08	31,9	11,26	76,85
India	6700	–8,0	11,52	3,57	35,7	3,54	96,3
Indonesia	11812	–1,9	12,47	5,29	37,8	2,87	80,09
Iran	12389	–1,5	72,16	4,67	40,8	8,66	53,7
Italy	42492	–9,2	155,28	6,39	35,9	8,67	93,52
Japan	41429	–5,1	5,56	5,87	32,9	10,95	47,22
Kazakhstan	26351	–2,7	17,19	6,06	27,5	2,92	89,35
Korea	42765	–1,1	2,97	5,87	31,6	7,56	43,52
Malaysia	28364	–5,8	3,09	5,38	41,0	3,76	73,15
Mexico	19796	–8,5	138,41	6,47	45,4	5,37	82,41
Netherlands	56935	–4,1	86,84	7,45	28,5	9,97	79,63
Nigeria	5135	–3,2	0,9	4,72	35,1	3,89	85,65
Pakistan	4690	–0,4	5,81	5,69	33,5	3,2	89,81
Philippines	8908	–9,6	10,8	6,01	44,4	4,4	96,3
Poland	33221	–3,4	107,51	6,19	29,7	6,33	83,33
Russia	27044	–3,6	54,82	5,55	37,5	5,32	85,19
Saudi Arabia	46962	–3,9	19,1	6,41	n/a	6,36	91,67
South Africa	12482	–7,5	83,24	4,81	63,0	8,25	84,26
Spain	40903	–11,1	140,08	6,4	34,7	8,98	85,19
Thailand	18460	–6,6	0,12	6	36,4	3,79	76,85
Turkey	28424	1,2	33,48	5,13	41,9	4,12	75,93
Un. Kingdom	46659	–10,0	176,9	7,16	34,8	10	79,63
United States	62530	–3,4	148,65	6,94	41,1	16,89	72,69

Source: IMF, 2021; Helliwell et al., 2020.

3. ANALYSIS OF THE CIRCUMSTANCES ASSOCIATED WITH THE MORTALITY RATE FROM COVID-19

Data for 30 countries on the rate of change in GDP in 2020 and on the death rate from covid-19 do not allow us to confidently interpret the decline in GDP growth as a kind of payment for saving human lives (Figure 1).

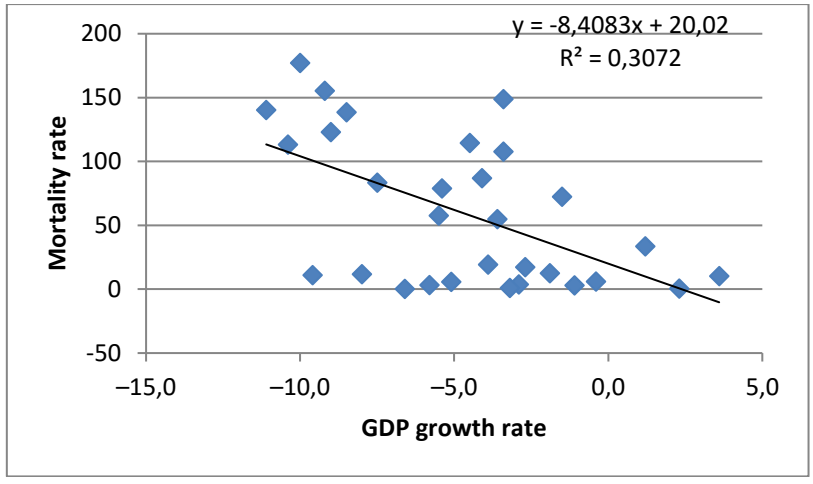

Figure 1. COVID-19 mortality rates per 100,000 population and GDP growth rates for 30 countries

Source: prepared by the author

The low mortality rate from COVID-19 with a significant (more than 5%) drop in GDP is observed only in five countries: Japan, Malaysia, Thailand, India, Philippines. Especially strong decline in GDP against the background of high mortality occurred in Mexico, France, Italy, United Kingdom, Argentina, Spain. When a large proportion of the population is infected with COVID-19, only a very limited number of countries manage to maintain a low mortality rate from this virus without a sharp fall in GDP (Turkey, Norway).

Using a larger sample of countries (108 countries), although with a less accurate GDP forecast (World Economic Outlook, October 2020), results in an even weaker link between GDP change and COVID-19 mortality (Figure 2).

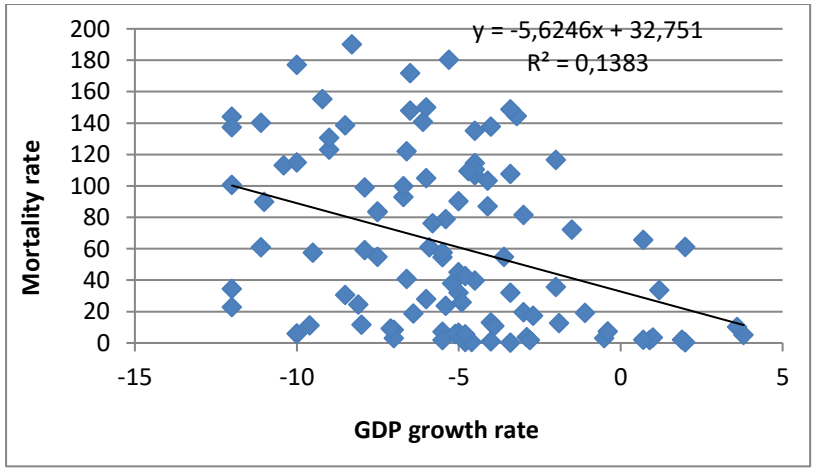

Figure 2. COVID-19 mortality rates per 100,000 population and GDP growth rates for 103 countries

Source: prepared by the author

Analysis of updated GDP data does not support the conclusion (Chaudhry et al., 2020) that there is a significant link between lower income variance within a country and lower COVID-19 mortality (Figure 3). So Canada, Australia, Spain, United Kingdom have similar values of the Gini index. However, the AVID-19 mortality rate in Canada and Australia is several times lower than in Spain and the United Kingdom. The mortality rate in the latter two countries is more than four times higher than in Turkey, although the income inequality in this country is much more significant.

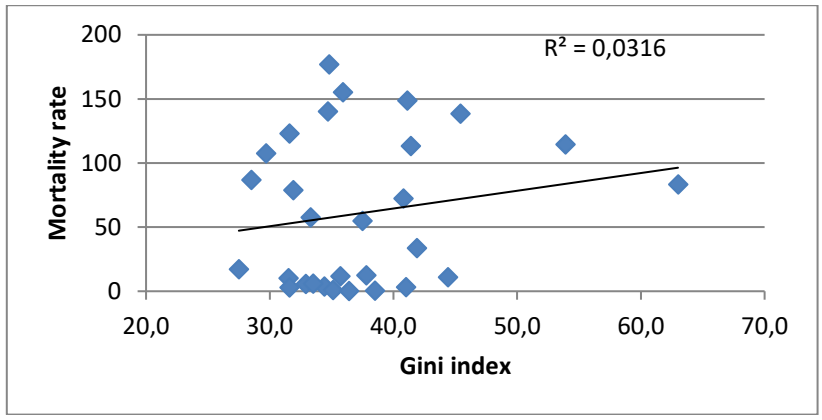

Figure 3. COVID-19 mortality rates per 100,000 population and Gini indices for 29 countries

Source: prepared by the author

As can be seen from Table 1, a number of countries with high per capita income were among the leaders in terms of mortality from COVID-19. In general, there is not a very strong (R^2=0.167), but a positive relationship between these parameters. The experience of the COVID-19 pandemic shows that a country's high per capita income alone does not ensure its resilience to epidemic threats. The same can be said about the share of health care costs in the country's GDP (Figure 4). As already noted, the relationship between this share and the CFR indicator is similar (Sorci et al., 2020).

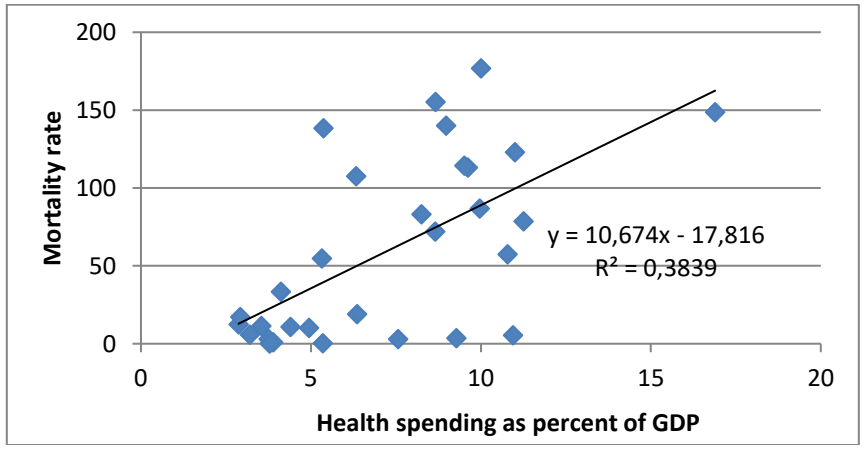

Figure 4. COVID-19 mortality rates per 100,000 population and the share of health care costs in GDP for 30 countries

Source: prepared by the author

Does COVID-19 mortality depend on how happy people think they are? Some answer to this question is shown in Figure 5.

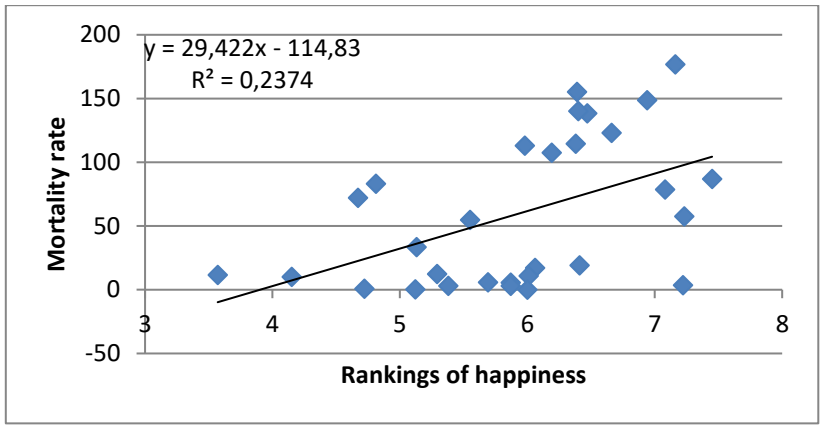

Figure 5. COVID mortality rates-19 per 100,000 population and rankings of happiness for 30 countries

Source: prepared by the author

A group of countries with high and relatively high rankings of happiness with low mortality from COVID-19 is noteworthy. This group of countries includes Australia, Saudi Arabia, Thailand, Philippines, and Kazakhstan.

As for the severity of the State response to the first wave of COVID-19, the results of this response are very different across countries (Figure 6).

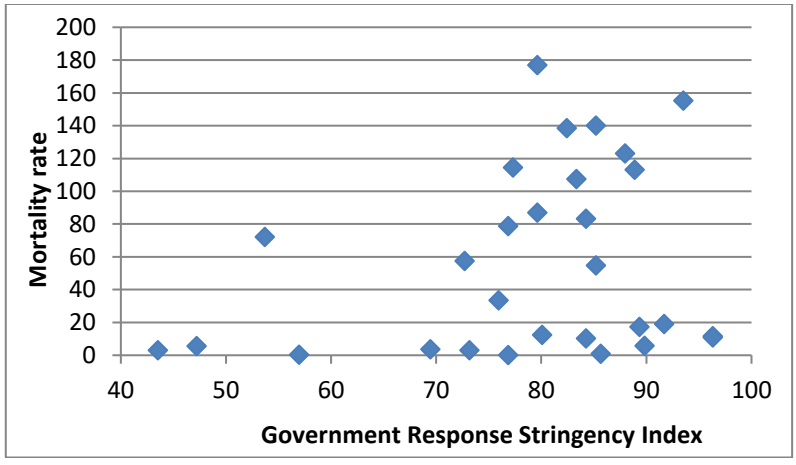

Figure 6. COVID-19 mortality rates per 100,000 population and Government Response Stringency Indices for 30 countries

Source: prepared by the author

The low mortality rate from COVID-19 with strict measures of the state response to the pandemic is observed in such countries as Egypt, India, Indonesia, Nigeria, Pakistan, Philippines. However, the strict restrictions imposed by the state during the first wave of COVID-19 did not prevent high mortality in countries such as Argentina, France, Italy, Mexico, Spain, and the United Kingdom.

The following regression analysis results show how COVID-19 mortality correlates with a combination of several circumstances (Table 2). At the same time, per capita income is not included in the considered variables, since it is one of the main factors in the formation of the Ranking of happiness.

Table 2. Regression analysis

Variables	*Coefficients*
Constant	-147,888** (71,06124)
x_1 - GDP change in 2020	-3,84953 (2,384284)
x_2 - Ranking of happiness	2,502421 (9,857813)
x_3 - Health spending as percent of GDP	10,48874*** (3,025475)
x_4 - Government Response Stringency Index	1,251816* (0,674422)
R^2	0,60

Note. The dependent variable is the mortality rate from COVID-19 per 100 thousand of the population. Standard errors are shown in parentheses. Characters ***, **, * indicate that estimates are significant at the level of 1, 5 and 10%, respectively.

Source: author's calculations.

CONCLUSION

The question of the criteria for the effectiveness of socio-economic systems remains a subject of discussion. The use of gross domestic product as such a criterion raises a number of objections (Sen et al., 2010). The life expectancy of citizens is one of the fundamental characteristics of the level of socio-economic development of the country. However, the real effectiveness of socio-economic systems is tested in severe trials, such as the Covid-19 pandemic. Not all leaders of the world economy demonstrate the ability to pass this test without great losses.

What are the conditions for a successful response to such calls? As the analysis of data for 30 countries shows, the usual ideas about a country's per capita GDP as a characteristic of its capabilities do not correspond to the challenges faced by countries in the context of the COVID-19 pandemic. A country with a large share of GDP spending on health care can have a high level of development of elite medicine with a rather weak development of primary and general health care. From this point of view, it is possible to understand why countries with similar Gini index values have very different mortality rates from COVID-19.

Frequent deaths from COVID-19 with a high Ranking of happiness suggests that life satisfaction weakens the body's defenses, acts on them in a demobilizing way.

The second wave of COVID-19 was met by a number of European countries with fairly low values of the Government Response Stringency Index. This had a negative impact on the mortality rate in such countries, despite the fact that the index in question was high during the first wave of the pandemic.

The nature of the relationship between the rate of decline in GDP and the mortality rate from COVID-19 should be particularly noted. There is no sufficient reason to interpret the decline in GDP growth as a downside to improving the epidemiological situation. Both the drop in GDP and the high mortality rate from COVID-19 are the result of countries ' lack of preparedness for large-scale challenges that disrupt the usual course of events. It should be borne in mind that the industrial revolution is also such a challenge.

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