Impact of Social Capital and Cultural Values on COVID-19

Rodica Cristina Butnaru[1], Gina Ionela Butnaru[2], Geanina Brînză[3] and Alexandru Anichiti[4]

[1)] University of Quebec, Montreal, Canada.
[2)] Alexandru Ioan Cuza University, Iași, Romania.
[3)4)] Ștefan cel Mare University, Suceava, Romania.
E-mail: reteaca.rodica_cristina@uqam.ca; E-mail: gina.butnaru@uaic.ro
E-mail: brinzageanina@gmail.com; E-mail: alexandruanichiti@gmail.com

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Abstract

COVID-19, caused by the SARS-CoV2 virus, determined the largest pandemic of the last century. 73 states were analysed from the point of view of the number of infections and deaths caused by COVID-19, influenced by the income inequality of the citizens of a country (GINI), social capital, and uncertainty avoidance. Populations face disproportionate rates of COVID-19 infection and mortality; inequalities consist of reduced access to health care, social mobility, or economic segregation (Oronce, et al., 2020). This study analyses the associations among the central aspects of social capital (trust in public institutions), income inequality (GINI index for income), national culture (level of uncertainty avoidance), and the SARS-CoV2 virus infection rate in 73 countries included in different time waves of the World Values Survey 2017-2020 (WVS) (Elgar et al., 2020). We performed the statistical analysis with the help of the Stata statistical program, and we used country level variables. The results of the study show that the income inequality of the citizens of a country (GINI), and uncertainty avoidance at the societal level influence the increase of the SARS-CoV-2 virus infection rate. On the other hand, the higher the trust in public institutions (social capital), the lower the SARS-CoV-2 virus infection rate. This research considers the variables related to social capital, as well as characteristics of the national culture, which may explain the SARS-CoV-2 virus infection rate. The results contribute to the understanding of the phenomenon at international level, and help the political authorities in formulating social solutions to this crisis.

Keywords: trust in public institutions, GINI, level of uncertainty avoidance, COVID-19, SARS-CoV2 virus infection rate, World Values Survey.
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Introduction

Bubonic Plague, Spanish Flu, Smallpox, Ebola, SARS and MERS, and now COVID-19 flu are not just health problems, they inevitably belong to our social nature. The COVID-19 pandemic broke out in Asia, spread rapidly in Europe, and then spread globally. COVID-19, compared to other epidemics, caused the amplification of the social problem through social networks, and certainly requires social solutions (Wu, 2021). The COVID-19 pandemic highly affected the economies, and disrupted global economic activities. Governments built a complex set of economic and health policies to control the crisis (Müller, 2020).

This topic quickly became a priority for researchers, and it was approached from several perspectives, i.e., based on social, economic, cultural, technological, medical factors, etc. Regarding economic factors, research shows that states with high income inequality have a high number of deaths due to the

SARS-CoV2 virus, which suggests that factors such as income inequality may explain why some countries are deeply affected by the COVID-19 pandemic (Oronce, et al., 2020).

Some researchers, such as (Ruck, et al., 2020; Bartscher, et al., 2020; Huynh, 2020), considered only one category of factors, and tried to explain its effects on the COVID-19 pandemic. To overcome this gap, the main purpose of this study is to integrate in the analysis more than one category of factors. In this research we consider a multidimensional approach, i.e., we analyse the SARS-CoV-2 virus infection rate from the perspective of the influence of social capital (trust in public institutions), income inequality (GINI index for income), national culture (level of uncertainty avoidance) in 73 countries included in the World Values Survey 2017-2020 (WVS).

Our study contributes to the literature on the importance of social capital and cultural values for society, considering the economic aspect of the country. The results of this study have important implications for policy makers when deciding in the future on health crisis measures.

In the first section, the study presents the analysis of the literature, followed by the research methodology and the research model, and at the end, a section of discussions and conclusions. The results show that income inequality of the citizens of a country (GINI) influences the increase in the SARS-CoV-2 virus infection rate, the higher the trust in public institutions (social capital), the lower the SARS-CoV-2 virus infection rate and that uncertainty avoidance will increase the SARS-CoV-2 virus infection rate.

Literature review

SARS-CoV-2 infection rate versus income inequality of the citizens of a country (GINI)

Infectious diseases can also be shaped by socio-economic status (SES), determined for example by habitus, nutrition, and crowded housing or clusters. Second, the focus on the unequal economy measured as income inequality (GINI index) should be complemented by measures of unequal wealth (GINI index for wealth), following the process of globalisation with tax-exempt multinational companies. Third, the aspects of social capital were measured in different time waves of the global values survey (EVS/WVS, 2021) for different countries, which is a weakness, because trust and other aspects of social capital vary over time, and depend on specific events, and social and economic trends (Wu, 2021).

Along the time, epidemics increased income inequality. The COVID-19 crisis led to job losses, and workers with lower education (pre-university) were most affected by the pandemic crisis (Furceri, et al., 2020). Thus, Aspachs, et al. (2020) show in their study that the effects of the COVID-19 pandemic can disproportionately affect the most vulnerable segments of the population, creating serious challenges for political stability and social cohesion. These issues led to wage inequality due to wage cuts, especially for low-income workers, and to job losses.

Countries with high levels of income inequality recorded significantly negative behaviours in terms of COVID-19 outbreaks, respectively deaths and number of cases. These aspects outline the socio-economic disadvantages which may influence the spread of SARS-CoV-2 and deaths associated with the virus. The elements shaping an image of the income inequality of the citizens of a country are obesity, smoking, pollution and/or poor housing. Governments must aim to bridge the gap between the citizens' income inequality and the low incomes of vulnerable groups, and to improve health (Wildman, 2021).

Therefore, this study proposes to test the following hypothesis:

H1: Income inequality of the citizens of a country (GINI) influences the increase in the SARS-CoV-2 virus infection rate.

Effects of COVID-19 on social capital

The mortality caused by COVID-19, social trust and group affiliation realistically illustrate that social capital issues can have negative effects on health. Mandatory rules implemented by governments have a significant impact on social distancing compared to national culture (Wang, 2020). Official strategies

associated with the COVID-19 pandemic are directly influenced by social capital, but there is no certainty that they will be an important factor in the components of COVID-19 (Bartscher, et al., 2020). Favourable economic developments are positively correlated with social capital, which is why it is considered that in times of crisis, in our case the health crisis generated by the COVID-19 pandemic, responsible social behaviour and collective action are required.

On the other hand, the empirical study conducted by Kokubun (2020) shows that there is a direct correlation between social capital and infection rates. In the same line, according to the study of Bartscher, et al. (2020), a higher social capital is expected to be indirectly positively correlated with the economy during the pandemic, and also post-pandemic COVID-19. In addition, the study shows that low social capital requires strict formal policies to curb the spread of the virus. Investments in building social capital are an insurance in case of future pandemics. Governments should focus on investing in social capital, not just in the health care system, in order to be well prepared for crisis situations similar to the crisis caused by the COVID-19 pandemic.

The empirical study conducted by Elgar, et al., (2020) mentions that social trust as a component of social capital, and group membership (cultural value related to the level of collectivism of a society) are associated with a higher death rate, possibly due to a higher infection rate and a lack of rigour in the physical distance policy.

Local community programs can increase social interaction and lead to pro-social behaviour and increased cooperation, which can be prerequisites for the formation of social capital, but investments need not be made only in areas with low social capital, because such an approach could lead to an erosion of social capital itself (Bartscher, et al., 2020). Economic units with strong social capital are correlated with slow declines in returns compared to economic units with low social capital.

Therefore, this study proposes to test the following hypothesis:

H2: The higher the trust in public institutions (social capital), the lower the SARS-CoV-2 virus infection rate.

The impact of uncertainty avoidance during the COVID-19 crisis

The way in which a society responds to a pandemic depends on collective behaviour, which is guided by cultural values specific to the cultural context (Ruck, et al., 2020). National culture is the explanatory vector of cultural differences among societies, and represents the context of collective behaviour. The cultural analysis model developed by Hofstede proposes six dimensions (individualism, power distance, masculinity, uncertainty avoidance, long-term orientation, indulgence), which explain the differences in collective behaviour among societies with a different mental programming (Hofstede, 2011). Individualism can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care only of themselves and of their immediate families (Hofstede, et al. 2010). Bazzi, et al. (2021) demonstrated that robust American individualism (which is a combination of individualism in this country and the opposition of society to government intervention) contributed to undermining collective action against the COVID-19 pandemic. Gelfand, et al. (2021) showed that societies with strict rules were much more successful in managing the pandemic than others, while Messner (2020) concluded that countries with a high indulgence score would be less compliant with public health rules, and would participate in social activities, which might have an impact on increasing the infection rate during the pandemic.

The level of uncertainty avoidance identified in the collective behaviour of a country is a dimension related to the level of stress in a society in the face of an unknown future (Hofstede, 2011). The uncertainty associated with the COVID-19 pandemic represents the disproportionate inability of the individual to tolerate the absence of obvious information about the effects of the current crisis. Uncertainty creates anxiety and insecurity, and the COVID-19 pandemic is considered a more threatening crisis by the people with higher intolerance of uncertainty (Sauer et al., 2020). Thus, the population had to comply with the national rules imposed since the beginning of the COVID-19 crisis; in addition, human behaviours were modelled according to their cultural context (Ruck, et al., 2020).

The study conducted by Huynh (2020) explained the role of cultural dimensions in the practice of social distancing worldwide. By extracting data from Google COVID-19 reports regarding community

mobility, and using cultural Hofstede factors for 58 countries between February 16th, 2020 and March 29th, 2020, it was found that countries with higher levels of the *Uncertainty Avoidance Index* predicted lower proportions of people gathering in public, such as retail and recreation, grocery and pharmacy, parks, transit stations, jobs. However, there is no predictive factor in relation to the percentage of citizens living in their residential areas. The control variable, GDP per capita (as a state of wealth) showed that the results were robust. Therefore, this paper suggests some effective communications on the COVID-19 pandemic by emphasising the role of uncertainties. Governments must build policy measures to limit uncertainties in order to positively influence the expectations of both consumers and economic units (Müller, 2020).

This study considers individualism, long-term orientation, masculinity, power distance, and indulgence as control variables.

Therefore, this study proposes to test the following hypothesis:

H3: Uncertainty avoidance will increase the SARS- CoV-2 virus infection rate.

Research methodology

This study analyses the associations among central aspects of social capital (trust in public institutions), income inequality (GINI index for income), national culture (level of uncertainty avoidance), and the SARS-CoV-2 virus infection rate in 73 countries included in various time waves of the World Values Survey 2017-2020.

Consequently, we formulated the following research hypotheses:

H1: Income inequality of the citizens of a country (GINI) influences the increase in the SARS-CoV-2 virus infection rate.

H2: The higher the trust in public institutions (social capital), the lower the SARS-CoV-2 virus infection rate.

H3: Uncertainty avoidance will increase the SARS-CoV-2 virus infection rate.

We used multiple linear regression models to assess whether the SARS-CoV-2 virus infection rate was influenced by social capital, GINI index, and the degree of uncertainty avoidance. The multiple linear regression analysis has been used because regression allows you to estimate how a dependent variable changes as the independent variable(s) change and multiple linear regression is used to estimate the relationship between two or more independent variables and one dependent variable. Statistical analysis began with the careful selection of independent variables and control variables, followed by testing Pearson correlations among variables. This was done to avoid the introduction in statistical analysis of strongly and statistically significantly correlated variables, which would have led to inconsistent results. Then followed the actual multiple linear regression analysis and verification of the parameters of the analysed model by comparing goodness-of-fit statistics.

Data analysis

This study used data taken from the World Values Survey database, the 2017-2020 survey. This survey includes data for 79 countries, but in this analysis, we used data for 73 countries, as for Andorra, Hong Kong, Macao, New Zealand, Puerto Rico and Taiwan, the World Bank (2021) website did not provide data on the GINI coefficient. Thus, with missing data, these countries were removed from the statistical analysis. We performed the statistical analysis with the help of the Stata statistical program, and we used country level variables. The data for the *Percentage of people tested positive for COVID-19 in the total number of tests* was sourced from worldometer.com, while the variable *Uncertainty Avoidance* from Hofstede-insights.com.

Selection and description of variables

The following variables are used in this study:

1) Dependent variable: a) Percentage of people tested positive for COVID-19 in the total number of tests (until March 7th, 2021);

2) Independent variables: a) GINI; b) Uncertainty Avoidance; c) Social capital – trust in the civil service;

3) Control variables: a) Individualism; b) Long-term orientation; c) Masculinity; d) Power Distance; e) Indulgence.

Table no. 1. Description of the variables used

Variable	Code	Description	Type of variable	Scale
Percentage of people tested positive for COVID-19 in the total number of tests	**Infection rate**	Percentage of people tested positive for COVID-19 in the total number of tests – at country level, until March 7th, 2021	Interval	0-100
GINI	**GINI**	The Gini coefficient has probably been the most traditional and well-known index in economics to measure income inequality in a society. Its values range between 0 and 1, where 0 indicates a society where everybody earns the same, while a Gini index approaching 1 means the opposite situation—that is, a society where a few people (and eventually only one person) earn most of the country's wealth. (Crespo and Hernandez, 2020, p.1).	Interval	0-1
Uncertainty Avoidance	**UA**	A dimension related to the level of stress in a society in the face of an unknown future (Hofstede, 2011).	Interval	0-100
Social Capital - civil service	**SC**	This dimension refers to the trust in public institutions. The variable has the values 5 for very low trust, 4 for low trust, 3 for medium trust, 2 for high trust, and 1 for very high trust in public institutions.	Likert (interval)	1-5
Individualism	**I-dc**	Individualism can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families (Hofstede et al. 2010).	Interval	0-100
Long-term orientation	**LTO-dc**	Societies who score low on this dimension prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion (Hofstede et al. 2010).	Interval	0-100
Masculinity	**M-dc**	The Masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness, and material rewards for success (Hofstede et al. 2010).	Interval	0-100
Power Distance	**PD**	Related to the different solutions to the basic problem of human inequality (Hofstede et al. 2010);	Interval	0-100
Indulgence	**I**	Related to the gratification versus control of basic human desires related to enjoying life (Hofstede, 2011).	Interval	0-100

Source: personal contribution

Research model

As shown above, in this paper we used multiple linear regression equations. We used this type of regression to evaluate how the SARS-CoV-2 virus infection rate was influenced by the social capital, the GINI coefficient, and the degree of uncertainty avoidance. We used the control variables: individualism; long-term orientation; masculinity; power distance; indulgence.

To test the hypotheses of this study and to analyze the factors influencing the SARS-CoV-2 virus infection rate, we used the multiple regression model shown in Equation 1 (Eq.1):

$$Y = \beta_0 + \beta_1 + \beta_2 + \varepsilon \quad (1)$$

Model 1 becomes:

$$Infection\ rate = \beta_0 + \beta_1 GINI + \beta_2 UA + \beta_3 I\text{-}dc + \beta_4 LTO\text{-}dc + \beta_5 M\text{-}dc + \beta_6 PD + \beta_7 I + \varepsilon \quad (2)$$

Model 2 becomes:

$$Infection\ rate = \beta_0 + \beta_1 GINI + \beta_2 UA + \beta_3 SC + \beta_4 I\text{-}dc + \beta_5 LTO\text{-}dc + \beta_6 M\text{-}dc + \beta_7 PD + \beta_8 I + \varepsilon \quad (3)$$

Where Y is the dependent variable, β are vectors of the parameter proposed to be estimated, ε is the error term.

Table 2 shows the parallel correlations among the variables. Thus, the correlations among the variables are weak, without a correlation above 0.700. Even if there are some variables significantly correlated, there is still no multicollinearity, which means that there are no factors preventing consistent results.

Table no. 2. Correlations among variables

		Infection rate	GINI	UA	SC	I-dc	LTO-dc	M-dc	PD	I
Infection rate	Correlation Sig. (2-tailed)	1								
GINI	Correlation Sig. (2-tailed)	0.370* 0.000	1							
UA	Correlation Sig. (2-tailed)	0.389* 0.000	-0.044 0.078	1						
SC	Correlation Sig. (2-tailed)	0.636* 0.000	0.118 0.147	0.520* 0.000	1					
I-dc	Correlation Sig. (2-tailed)	-0.313* 0.000	-0.285* 0.003	0.299* 0.000	0.030 0.176	1				
LTO-dc	Correlation Sig. (2-tailed)	-0.068 0.345	-0.397* 0.000	-0.149 0.90	-0.152 0.307	- 0.072* 0.000	1			
M-dc	Correlation Sig. (2-tailed)	-0.110 0.109	0.176 0.161	-0.093 0.116	0.045 0.278	0.087 0.089	0.027 0.103	1		
PD	Correlation Sig. (2-tailed)	0.354* 0.000	0.153 0.281	0.289* 0.000	0.065 0.212	- 0.700* 0.034	0.232 0.123	-0.448 0.096	1	
I	Correlation Sig. (2-tailed)	0.058 0.210	0.337* 0.000	-0.269 0.332	0.090 0.90	0.343* 0.000	-0.605* 0.000	0.044* 0.000	-0.441* 0.000	1

Note: *** indicates that p<0.05;

Source: our own calculations based on Stata statistical analysis software

Table 3 shows the regression coefficients. Two models were tested. Model I includes the cultural dimensions defined by Hofstede et al. (2010) as independent variable. Model II also includes the dependent variable social capital.

Table no. 3. Regression results

Model I			Model II		
Infection rate	**β**	**Std. error**	**Infection rate**	**β**	**Std. error**
GINI	0.004** (0.048)	0.001	GINI	0.003** (0.049)	0.001
UA	0.001*** (0.004)	0.000	UA	0.000* (0.057)	0.000
I-dc	0.000 (0.354)	0.000	I-dc	0.000 (0.725)	0.000
LTO-dc	0.000 (0.548)	0.000	LTO-dc	0.000 (0.327)	0.000
M-dc	0.000 (0.691)	0.000	M-dc	0.000 (0.124)	0.000
PD	0.001* (0.068)	0.000	PD	0.000 (0.818)	0.000
I	0.000 (0.240)	0.000	I	0.000 (0.422)	0.000
Cons.	0.300*** (0.000)	0.011	SC	0.136*** (0.000)	0.033
			Cons.	-0.311*** (0.000)	0.114

Note: *, **, *** indicates that p<0.10, p<0.05, p<0.01. Dependent variable: infection rate (percentage)

Source: our own calculations based on Stata statistical analysis software

Table 4 presents the goodness-of-fit statistics for the regression model: R^2, adj. R^2, root MSE and Prob. > F. Prob. > F tests of the model coefficients are significant ($p < 0.05$), confirming the causal relationship of the proposed models, and accepting the hypothesis that the β coefficients are different from zero. R^2 is 0.359 in the first model, and increases to 0.525 in the second model, which shows that model II is more efficient, with independent variables better explaining the dependent variable. The same is confirmed by the adjusted R^2.

Table no. 4. The goodness of fit statistics

Model I		Model II	
Root MSE	0.768	Root MSE	0.668
Prob. > F	0.000	Prob. > F	0.000
R^2	0.359	R^2	0.525
Adjusted R^2	0.265	Adjusted R^2	0.445

Source: our own calculations based on Stata statistical analysis software

Discussions

The following hypotheses were proposed in this study:

H1: Income inequality of the citizens of a country (GINI) influences the increase in the SARS-CoV-2 virus infection rate. The results show that a country's GINI score has a statistically significant effect on the percentage of COVID-19 infections in the total number of tests performed. The effect of GINI on the spread of infectious diseases had been studied before, generally observing a statistically significant effect of this indicator on the speed of the spread of infectious diseases. Therefore, hypothesis H1 is confirmed. This hypothesis confirms the results obtained in previous research by Elgar et al., (2020).

H2: The higher the trust in public institutions (social capital), the lower the SARS-CoV-2 virus infection rate. The results show that a country's social capital has a statistically significant effect on the percentage of COVID-19 infections in the total number of tests performed. The effect of this indicator on the spread of infectious diseases had been studied before, generally observing a statistically significant effect of this indicator on the speed of the spread of infectious diseases. Therefore, the hypothesis H2 is confirmed. Thus, the results obtained in previous research by Elgar et al., (2020), Wu (2021) and Kokubun (2020) are also confirmed.

H3: Uncertainty avoidance will increase the SARS-CoV-2 virus infection rate. The results show that the score of this cultural dimension (uncertainty avoidance) of a country has a potential significant effect on the percentage of COVID-19 infections in the total number of tests performed. In model I, this variable has a statistically significant effect on the dependent variable. However, in model II, the effect of this variable becomes statistically insignificant, as a result of the introduction of the variable *social capital* in the general model. Therefore, more studies are needed to determine whether the level of uncertainty avoidance has an effect on the spread of infectious diseases. Thus, the hypothesis H3 is only partially confirmed, which shows that we obtain results which partially contradict previous studies (Sauer et al., 2020; Gelfand et al., 2021).

Table 5 summarizes the results of the proposed hypotheses, as follows:

Table no. 5. Hypotheses results

No.	Hypothesis	Coefficient M1	Coefficient M2	Is the hypothesis supported?
H1	**GINI → Infection rate**	0.004** (0.048)	0.003** (0.049)	YES
H2	**SC → Infection rate**	Not in the model	0.136*** (0.000)	YES
H3	**Uncertainty avoidance→ Infection rate**	0.001*** (0.004)	0.000* (0.057)	Partially

Note: *, **, *** indicates that p<0.10, p<0.05, p<0.01.

Source: our own calculations based on Stata statistical analysis software

Conclusions

The aim of this article was to answer the following question: *Can international capital, the GINI coefficient, and the degree of uncertainty avoidance explain international differences in increasing the SARS-CoV-2 virus infection rates?* It is widely assumed that social cohesion, public confidence in government sources of health information, and general concern for the wellbeing of others have a positive effect on the infection rate in a pandemic (Elgar et al., 2020). Country data on *income inequality, social capital,* and *uncertainty avoidance* were related to the values of SARS-CoV-2 infection rate in 73 countries, and these relationships were tested through the statistical analysis.

The infection rate was positively and statistically significantly correlated with income inequality and low confidence in public institutions (low social capital), while the degree of uncertainty avoidance was statistically significantly correlated with the infection rate in the first model, becoming statistically insignificant in the second model. These associations took place in multiple and controlled linear regression models, taking into account Hofstede's cultural dimensions (Hofstede et al., 2010). The results indicated that more economically unequal societies, where the level of social capital was low, recorded more SARS-CoV-2 virus infections.

On the other hand, cultural differences, i.e., the level of uncertainty avoidance of the society, have a potential impact on the SARS-CoV-2 virus infection rate. Due to the fact that the hypothesis H3 is only partially confirmed, in future research it is necessary to study this variable by groups of countries to determine the effect of uncertainty avoidance on the spread of infectious diseases. This study has some limitations. Firstly, there were countries and territories that were not part of the analysis due to the lack of information from the World Bank regarding their GINI: Andorra, Hong Kong, Macao, New Zealand, Puerto Rico and Taiwan. Secondly, the accuracy of the results depends a lot on the accuracy of the data provided by the governments of the countries involved in the study. However, we believe that this article has practical implications and contributes to the global understanding of the phenomenon and helps the political authorities in formulating social solutions to this crisis. The implications of this study are two-fold. Firstly, it shows that countries with a high-income discrepancy (GINI) are in a poor spot when it comes to epidemics and pandemics with more effort being required from these states in order to keep their most vulnerable citizens safe in case of a pandemic. Secondly, social capital is also very important, and, in times of crisis (health crisis) the institutions of the state should make efforts to maintain or improve their public image.

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