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Study of Pandemic of 2020-2021 by Sociocultural Groups of Countries: Applied Analysis of Parameters [1]

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Abstract

Sociocultural factors have become a priority area in research within the framework of theories of long-term development. This article discusses the parameters of groups of countries (values of survival-self-expression and traditional-secular-rational values) according to the Inglehart-Welzel cultural map, along with other sociocultural and socio-economic indicators. The significant cumulative advantage (gross domestic product (GDP) per capita) of three groups of countries—Anglo-Saxon, Protestant, and Catholic—compared to the rest reflects a long history of world progress. A number of the social parameters of these groups probably reflect their level of development, to which other factors have played a role in the long term. A key question addressed in the article is whether sociocultural factors that have developed over long periods have a significant impact on the behaviour of countries in the context of modern crises, and in this case, on the incidence of vaccination in countries in critical conditions. To answer this question, qualitative and quantitative methods of analysis have been conducted using the instance of the COVID-19 pandemic in 2020–21. The hypothesis was tested on an array of 80–94 countries for which there was relevant statistical data. The tables and calculations presented in the article indicate the following results: countries more advanced in the direction of self-expression values on the Inglehart scale demonstrate higher vaccination

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scores and lower disease scores, and those oriented toward secular-rational values have higher rates of suicide than countries with predominantly traditional views.

Keywords: pandemic, recession, Inglehart and Welzel, sociocultural codes
JEL: A13, E14, C43, F63

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Introduction

The COVID-19 pandemic and its immediate consequences in 2020–21 affected the world's economic dynamics and social development, an impact that will probably be studied, evaluated, and debated by many research groups and scientists. The critical aspects of this crisis turned out to be its abruptness, its synchronic spread across countries, the depth of the decline in economic activity, and the absolute need for government intervention [Grigoriev, 2020]. At the same time, vast differences between countries at the development level, the organization of healthcare systems, the nature of national institutions, and sociocultural characteristics were factors at play in the course of the 2020 crisis and the fight against the coronavirus pandemic. Some of the main parameters for entering a recession and its features were previously touched upon in previous studies [Grigoriev et al., 2020; Grigoriev et al., 2021]. It is worth noting several reports and articles by the United Nations (UN), the International Monetary Fund (IMF), and others on the problem of the so-called "coronacrisis" caused by the COVID-19 infection [IMF, 2020; UNWTO, 2020].

The economic stability of countries can be studied not only with the help of socio-economic approaches, expressed in measuring the level of well-being of citizens, the level of taxes levied, disposable income, and the proportion of the poor and affluent population, but also with the help of sociocultural approaches.

Many international researchers, such as J. Lake and others, have examined the relationship between social values and social actions and the effectiveness of taking measures against coronavirus infection and stabilizing economic policies based on a survey of individual Australians. The survey results show that Australians appreciate social discipline and strictly observe coronavirus prevention measures. They were ready to be vaccinated if a COVID-19 vaccine was available and to follow social distancing [Lake et al., 2021]. E. Bonetto and his co-authors conducted a similar study on the impact of cultural values on social distancing between persons and compliance with movement restrictions based on an online questionnaire carried out in France during the first quarantine of the COVID-19 pandemic (between 2 April and 11 May 11, 2020). The authors concluded that the stronger the threat, the more the French

adhere to conservation values and, therefore, the more they follow government measures [Bonetto et al., 2021].

We consider it is essential to look at these issues at the cross-country level. A. Auzan and E. Nikishina have raised the issue of the importance of studying the role of cultural values in resolving the macroeconomic shock caused by the COVID-19 pandemic, noting that "... the relevance of a repeated cross-country study tracking comparative movements between countries is increasing" [2021, p. 39].

While it is difficult to measure and apply cultural norms practically in scientific works, R. Inglehart and C. Welzel, and G. Hofstede have overcome this barrier, developing a quantitative measurement of culture as the basis of their works [Lebedeva, Tatarko, 2009].

By sociocultural codes (hereinafter SCC[2]) or factors, we mean national values and parameters that influence people's beliefs and lives and were fixed by each individual society at a previous time [Auzan, Nikishina, 2021. We also note that the role of cultural codes is usually associated with their impact on the pace of development (in particular, rates of economic growth) of countries in the past and over long periods [Auzan, 2015]. However, the significance of sociocultural factors and indicators of the social structure cannot be excluded from analysis during a global pandemic and recession. We suppose that sociocultural codes are important in terms of influencing a state's long-term development through the behaviour of people and public institutions. In that case, they should also manifest themselves in the short run periods of the crisis.

In the present research, the values of Inglehart and Welzel will be analyzed (as an experiment) by the use of coordinates, which reflect the type of values, not only for a qualitative method of study but also for a quantitative assessment. According to Inglehart, the two stages of modernization (industrial and post-industrial) are characterized by different threats. In the industrial stage, there were challenges that every person faced; these were dangers seen and felt by individuals (famine and plague are examples of this type of threat). The post-industrial stage is characterized by global problems of a more abstract nature, such as ocean pollution and global warming [Inglehart, Welzel, 2011, pp. 56–7]. In other words, these are threats that one part of the population perceives acutely, but which the other does not consider significant. Also, note that countries' values tend to change in response to external threats. As Inglehart and Welzel suggested: "Socioeconomic development leads to predictable cultural and political changes, and the collapse of the economy generates changes in the opposite direction" [2011, p. 39].

Drawing an analogy, we rest on the belief that awareness of preserving the planet's climate refers to the problem of the post-industrial stage while requiring individual-level solutions to support the actions of states. And the sudden pandemic in 2020, which threatened the health of populations globally and was followed by a recession after lockdowns to combat the spread of the virus, may be assigned to an industrial stage of modernization. Everyone has directly felt the economic and social aftermaths of the coronacrisis, which are extremely difficult to deal with individually. In the context of the 2020 pandemic shock, lockdowns played a substantial role in the consumption of services for which demand from the wealthy part of the population was significant [Grigoriev et al., 2021].

[2] As well as "cultural codes," "cultural values," "behavioural codes," "value portfolio," and other synonyms.

It is conspicuous that the nature and structure of consumption may depend on the sociocultural lifestyle of the country's population. "New forms of consumption are no longer focused primarily on demonstrating people's economic situation. They are increasingly becoming a way of self-expression of the individual, a manifestation of individual tastes and lifestyle" [Inglehart, Welzel, 2011, p. 159].

Following restrictive measures and the instructions of state (medical) authorities and getting vaccinated look like aspects of an "industrial problem." Then, compliance with the regime of social distancing and the authorities' regulations depends on the degree of threat awareness by an individual state. Cases in point are Italy and Germany, where R. Dürente and co-authors found a positive correlation between civic capital (voluntary compliance with social distancing rules) in 2020 among the Italian population and the movement of people in society, as a result of which they discovered that surveyed Italians and Germans, realizing the threat of a pandemic, reduced mobility even before the adoption of quarantine restrictions by the government. So, in general, cultural norms regarding mobility matter in determining the most effective government response to the pandemic [2021].

Epidemics shocking the economic world have occurred before. Then, too, people took lockdown measures: aristocrats in the 14th century practiced self-isolation from the plague and fumigated their houses with smoke, although success was modest. Extensive cholera quarantines were common in the past. A 2020 paper by R. Barro and co-authors viewed the depth of the economic downturn in 42 countries between 1918 and 1920 as the result of two factors: World War I and the Spanish flu epidemic [2020]. The depth of a recession influences perceptions of economic and physical security concerns, the level of people's trust in government, lifestyle patterns, and their willingness to invest their own money in universal healthcare systems. Or, as the authors of the article "Cultural Values Predict National COVID-19 Death Rates" note, governments in more tolerant and democratic countries are having difficulty mitigating the effects of the COVID-19 pandemic because the population and institutions of these countries are characterized by self-expression values instead of survival [Ruck et al., 2021].

Previous studies have attempted to apply cultural indicators to the COVID-19 outbreak. In particular, there is a positive correlation between such socio-psychological characteristics—Hofstede's metrics—as individualism, uncertainty avoidance, and the spread of coronavirus infection, which can be measured in the number of confirmed cases of disease and deaths [Chen, Biswas, 2022]. The analysis, conducted on the instance of European countries, also recorded a significant impact of cultural differences on formal or informal practices in fighting the pandemic. The factor of "tolerance and trust" in authorities has a negative impact on the growth rate of those infected with coronavirus, while there is a considerable positive influence of "individualism and indulgence" on the rate of increase in cases of COVID-19. This reflects the degree of the society's liberality, where the rules become less strict [Gokmen et al., 2021].

In this article, we apply the value coordinates developed by Inglehart and Welzel practically to assess the correlation between indicators which reflect coronavirus (proportion vaccinated, number of confirmed infected cases), as well as suicide rates and countries' cultural norms. This allows us to determine whether SCCs can indeed provide a clearer picture of the nature of the relationship between country values and COVID-19 disease parameters and

vaccines and whether they may be among the reasons why society can respond to the macroeconomic shock caused by COVID-19.

In essence, this is a question about the relevance of using cultural codes in the short run perspective and of the ways to measure them while studying the impact of a country's value portfolio on people's behaviour in times of crisis. Presumably, sociocultural approaches can be transformed into a tool for current economic analysis. In reality, we are talking about the reaction of culturally diverse country groups to such critically significant phenomena as restrictive measures, vaccination, and their attitudes toward their own lives and those of others.

Inglehart and Welzel's Map

Cultural values can be adequately considered as an explanatory factor in people's economic behaviour since they characterize the features of a country's values and also determine people's abilities and skills to conduct entrepreneurial activities and their willingness to obey the law and rules.

To identify and evaluate the nature of the influence of the state's SCC on the results of the fight against the coronacrisis, we turn to the Inglehart and Welzel map, which is a two-dimensional measurement of the values of various countries over seven waves from 1981 to 2022 based on ongoing social surveys [World Values Survey, n.d.]. Let us mark that the map of Inglehart and Welzel cultural codes includes an extensive spread of groups of countries on two scales of the map (Figure 1). As already mentioned, while constructing the map, the authors focused on the theory of a two-stage modernization of the civilization's socio-economic development [Inglehart, Welzel, 2011].

The transition from industrial to post-industrial society is indicated through the horizontal axis of measurements of the value portfolio of countries. The horizontal scale illustrates the polarity of survival values, which put issues of economic and physiological security above all else, against self-expression values, where particular importance is attached to a high appreciation of human rights, environmental protection, and active political opposition [Ibid.]. The transition to an industrial type of society is reflected on the vertical axis with traditional and secular-rational values**. Traditional values** symbolize the primacy of religion, the acceptance and reverence of authority, conformism, nationalist ideologies, and collectivism, and the rejection of divorce, abortion, euthanasia, and suicide. **Secular-rational** values express a preference for a secular state, the presence of individualistic ideas, the subordinate role of religion, and family values. "Divorce, abortion, euthanasia, and suicide are considered relatively acceptable" [World Values Survey, n.d.].

The transition of the world to the post-industrial stage is reflected on the horizontal axis with the values of self-expression and survival. **Survival values** represent economic and physical security issues, obedience, low appreciation of human rights, and lacking trust and tolerance levels. **Self-expression values** are connected with environmental issues and protection, tolerance for foreigners, the growing demand for participation in life's economic and political spheres, and a high appreciation of human rights [World Values Survey, n.d.].

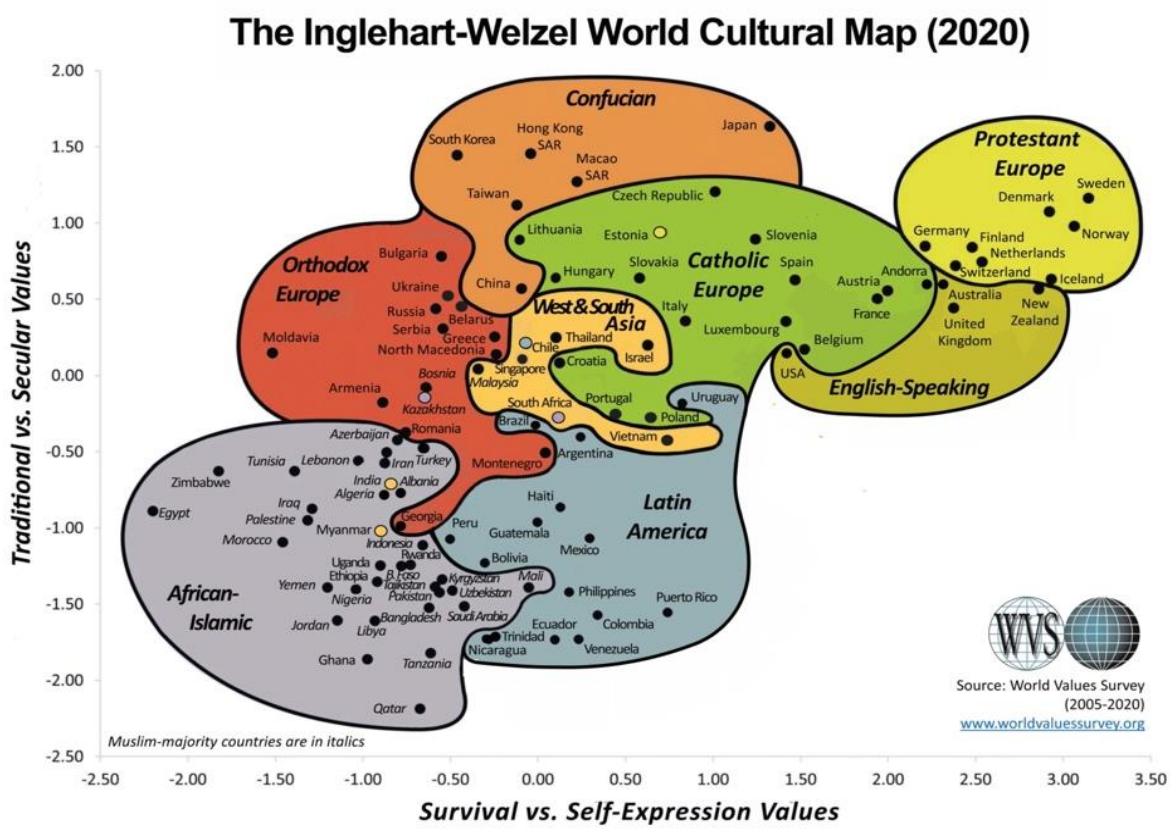

Chart 1. Inglehart and Welzel Cultural Map of the World: World Values Survey*
Note 1: The horizontal and vertical axes illustrate the polarization of opposite values. Negative values on the abscissa and ordinate axis reflect the values of survival and traditional values, respectively. The positive is the values of self-expression and secular-rational. Numerical values were obtained by the authors and converted to conventional coordinates in the course of a multi-stage factorial and correlation analysis.
Source: [World Values Survey, n.d.].

As highlighted previously, Inglehart and Welzel are not the first scientists attempting to quantify SCC. Before Inglehart's research, sociocultural indicators were measured by G. Hofstede, who initially calculated four cultural parameters (uncertainty avoidance, power distance, masculinity, and individualism) based on social surveys of IBM employees [Fujita, 2002, p. 47]. Hofstede's metrics and research have been popular in business and marketing, as the gauged cross-cultural approaches have been adopted to determine worker mobility among large branch companies. In 1980, Hofstede presented his book *Implications of Culture: International Differences in Labor Values*, which provided a statistical analysis of the four main cultural dimensions and the primary outcomes [Yoo et al., 2011, p. 47]. Further research and development were continued by the Hofstede Insights organization, which supplemented the Hofstede model with two additional indicators: long-term orientation and indulgence.

However, according to Hofstede Insights, the subsequent measurement of cultural indicators used in the current research was based on social survey estimates for elite groups, including public service managers, student commercial airline pilots, and the wealthiest 10% of the nation [Hofstede Insights, 14.05. 2021], while the Inglehart surveys, which are later used to determine the coordinates and trajectories of countries on the map, are based on all population groups and are not limited to income levels. Hofstede's theory is also, for the most

part, based on microprocesses [Steenkamp, Geyskens, 2012, p. 256]. Since Hofstede's statistical basis refers to the 10 deciles of the population by income, that is, the most educated and wealthy part of society, we postpone using Hofstede's materials. That is why in this article, an experiment is set up on the possibility of using the quantitative evaluation of values according to the methodology of Inglehart and Welzel to identify their relationship with modern problems caused by the coronavirus pandemic.

Returning to the problem of sociocultural factors' influence on the way out of the recession, we have taken notice of increased attention to individual free choice and non-material aspects of life caused by the 2020 coronavirus crisis [CCSA, 2021; Lampert et al., 2021]. The recession attributable to the outbreak of the 2020 pandemic is unusual [CCSA, 2021; Grigoriev et al., 2020]. It was followed by a series of equally extraordinary economic phenomena.

First, COVID-19 has led to an uneven contraction in economic activity due to varying levels of quarantine and restrictive measures implemented by states and has resulted in a widening gap between the haves and the haves-not [Grigoriev et al., 2021, p. 27].

Second, owing to the limitation of economic activity, a significant drop has occurred in the service sector—in the manufacturing industry, the actions of continuously operating enterprises could not be suspended—therefore, a substantial decline in 2020 occurred in countries that are more involved in the service sector [Grigoriev et al., 2020, p. 13]. The population's fatigue from lockdowns may have expressed itself as a reaction, in 2021, in the form of a rapid increase in car trips in most countries [Grigoriev, Kheifets, 2022].

Third, the consumer patterns of many countries have changed. People in some segments of the population did not have the opportunity to spend their free time doing their favourite activities, which generally transforms the structure of people's needs according to Maslow's pyramid: moving down from the top three steps of the pyramid (needs for self-expression and self-realization, needs for respect and recognition, and social needs) to basic existential and biological needs [Grigoriev, 2020]. Critical situations can change citizens' individual and normative behaviour, which can lead to selfish consumer behaviour or excessive consumption of goods of one category [Tabernero et al., 2020]. The economic impacts of the COVID-19 outbreak, which are unusual for typical crises, are listed as part of a unique response by governments to contain the spread of the infection.

It may be assumed that the shock of the 2020 pandemic will likely lead to profound shifts in behaviour and the hierarchy of values, but this is a matter for future research. It should be noted that in the context of the pandemic, the moral and cultural values of people have changed. In any case, specific switches in behaviour are observed: people have begun to make mental and physical health, vitality, and precautions a priority, while all recreational, entertainment, and cultural enrichment values, and also material values, have become secondary [Lampert et al., 2021]. In the scientific world, the healthcare system and the development of advanced digital technologies are being put in first place due to the need for remote business and distance education. Auto, aviation, shipbuilding, and other industries have been drawn into a severe recession. Even though a number of researchers argue that the stability of values is relatively high and their restructuring over a short period of time (that is, over the course of the coronavirus pandemic) is impossible [Giavazzi et al., 2014], others rest on the

belief that the impact of pandemics on cultural values is significant [Barro et al., 2020; Ruck et al., 2021].

In the social sphere, we can pay attention to the dual effect of the 2020 pandemic: first, the impact of ingrained cultural values on the type of pandemic management (unnecessary panic, negligent behaviour, institutional trust) and, second, the effect of the 2020 pandemic itself on the restructuring of the SCC and changing consumer preferences [Lampert et al., 2021]. For the second type of effect, one can cite as an instance the increase in pessimism among young people, or the growth in concern about the spread of coronavirus infection among the generation of "zoomers" [Lampert et al., 2021, p. 31; Min et al., 2021, p. 281]. COVID-19 and the financial crisis of 2008, which the youth faced, have significantly impacted the manifestation of psychological characteristics and the formation of the generation. "As Generation Z grew up in a strong economy with low unemployment, the COVID-19 pandemic is likely to be one of the most significant events that have affected them" [Min et al., 2021, p. 283].

We subscribe to the belief that the reaction of societies and governments to a significant external shock such as the COVID-19 pandemic should reflect on their sociocultural attitudes. This is especially essential when considering the suddenness of the surprise. A detailed analysis of the socio-economic picture of the world in the context of the 2020 pandemic with the usage of Inglehart maps requires a significant scale of work and a particular methodology. Some general economic conclusions were presented in "The Perfect Storm of Personal Consumption" [Grigoriev et al., 2021]. The governments of wealthy countries have opted to provide sizeable financial assistance to the economy and population in order to prevent the deep recession. Realizing the seriousness of the threat, people have adapted to isolation and social distancing required by governments. As a result, normative behaviour has arisen to ensure that norms and government measures were followed for the common good [Tabernero et al., 2020]. We believe that in relation to the fight against the pandemic, the situation was more dependent on the course of the disease and the nature (and condition) of a country's healthcare system. To a certain extent, we may assume that the wealthier countries relied on the healthcare system. In contrast, the less affluent countries were forced to rely upon the strictness of the lockdowns and on the restrictive measures introduced (see Table 1). The actual combination of the seriousness of lockdowns and calculations of the healthcare system's efficiency determined the parameters of the pandemic (morbidity, mortality, vaccination) that the final statistics provide.[3] To separate one from another would be extremely interesting but this would require a sizeable statistical base at the micro level.

Emerging countries have likely limited fiscal space, making it difficult to combat the coronavirus as they are less willing to invest in health system development [Calderon, Kubota, 2021]. As shown by the experience of several Ebola outbreaks in 2013–2016 in western African regions, many African states responded quickly to the spread of COVID-19 and took isolation and quarantine measures immediately [Mennechet, Takoudjou Dzomo, 2020]. In other words, lockdowns are somewhat typical of the African-Islamic group.

[3] We are aware of the possible imperfection of the statistics used on the parameters of the pandemic caused by the specifics of the methodology of the national statistical authorities of different countries; however, we believe that it does not significantly affect the results of the study.

We proceed from the fact that the level of development and the nature of sociocultural codes are the cumulative results of a country's development about a century and a half before the 2020 pandemic [Grigoriev, Morozkina, 2021]. At the same time, their role was to manifest precisely in such a dramatic situation. Otherwise, the question of the use of codes can be turned in an unexpected direction: what do they generally affect in a stressful mode? This, of course, does not diminish the potential role of the SCC in long-term development. At the same time, if a role is not revealed in a crisis situation, this will limit their weight. In the medium term (two to three years), developed countries should find a solution to the issue of vaccines. However, the main problem remains the massive social inequality in healthcare in more liberal countries [Grigoryev, Morozkina, 2023].

Table 1. Social Indicators for Inglehart Country Groups for 2019 and Pandemic Parameters for 2020–22

For 94 countries[4]	GDP PPP per capita in 2019 (constant 2017 Int$)	Income share held by highest 10% (data for the last available year)	Health expenditure per capita in 2019 (current US$)	Health expenditure per capita in 2019 (% of GDP)	Fiscal measures in response to the COVID-19 pandemic (% of 2020 GDP)	Suicide rate per 100,000 in 2019	COVID-19 stringency index (average Q2-Q4 2020)	Total confirmed cases COVID-19 per million (from 20 Jan 2020 to 28 Feb 2022)	Total vaccinated per million for last available date (February 2022)
Protestant Europe	57.7	23.3	6356.2	10.3	7.9	12.9	53.0	285.7	749.8
English-speaking	56.3	27.0	5891.6	10.7	18.3	11.5	64.1	168.6	629.8
Catholic Europe	44.6	24.0	2682.9	8.1	8.2	14.2	56.2	296.7	692.5
Confucian (without China, Hong Kong and Macao)	42.4	25.2	3492.5	9.5	11.6	22.0	45.0	51.8	830.1
Confucian (with China but without Hong Kong and Macao)	33.6	26.6	2506.7	8.1	9.3	17.3	54.2	34.5	838.3
West & South Asia	33.2	33.4	1275.0	6.1	9.9	10.1	64.4	132.3	718.4
Orthodox Europe	20.8	25.3	600.6	7.0	5.9	13.5	57.6	177.6	428.1
Latin America	16.2	34.5	611.7	7.3	4.3	7.3	71.6	94.0	625.0
African-Islamic	9.8	28.5	210.3	4.8	3.2	5.1	68.4	41.9	352.6

Source: Calculated by the authors based on data from the World Bank [n.d.], the IMF [2020], and the Global Change Data Lab [n.d.].

[4] The list is presented in Annex 1

Relationship Between Pandemic Parameters and Socio-Economic Indicators in the Inglehart and Welzel Groups

The Inglehart and Welzel's approach based on the sociocultural mix of confessional and regional groups of countries gives us a picture of a world as the very the complex srtructure, neatly expressed by set of specific maps. However, the consideration of socio-economic indicators for these groups raises the question of how the level of development corresponds to the nature of the groups and how the historically accumulated levels of well-being and the established sociocultural codes correlate. The pandemic and its associated social indicators may be an experimental test of the interaction of culture and sociology in an interdisciplinary approach. Nevertheless, applied results, in particular the specifics of the interaction of factors, can be taken into account and involved in the elaboration of a strategy for the development of the world, for instance, at the next stage of the sustainable development goals.

To illustrate the complex and non-obvious links between socio-economic indicators and SCC, which we consider significant in the context of the Inglehart and Welzel groups, we present several graphs.

The graphs below reveal the visual expression of Table 1, and also link the social indicators of country groups according to the Inglehart maps with coronavirus incidence rates for the period from 20 January 2020 to the end of February 2022.

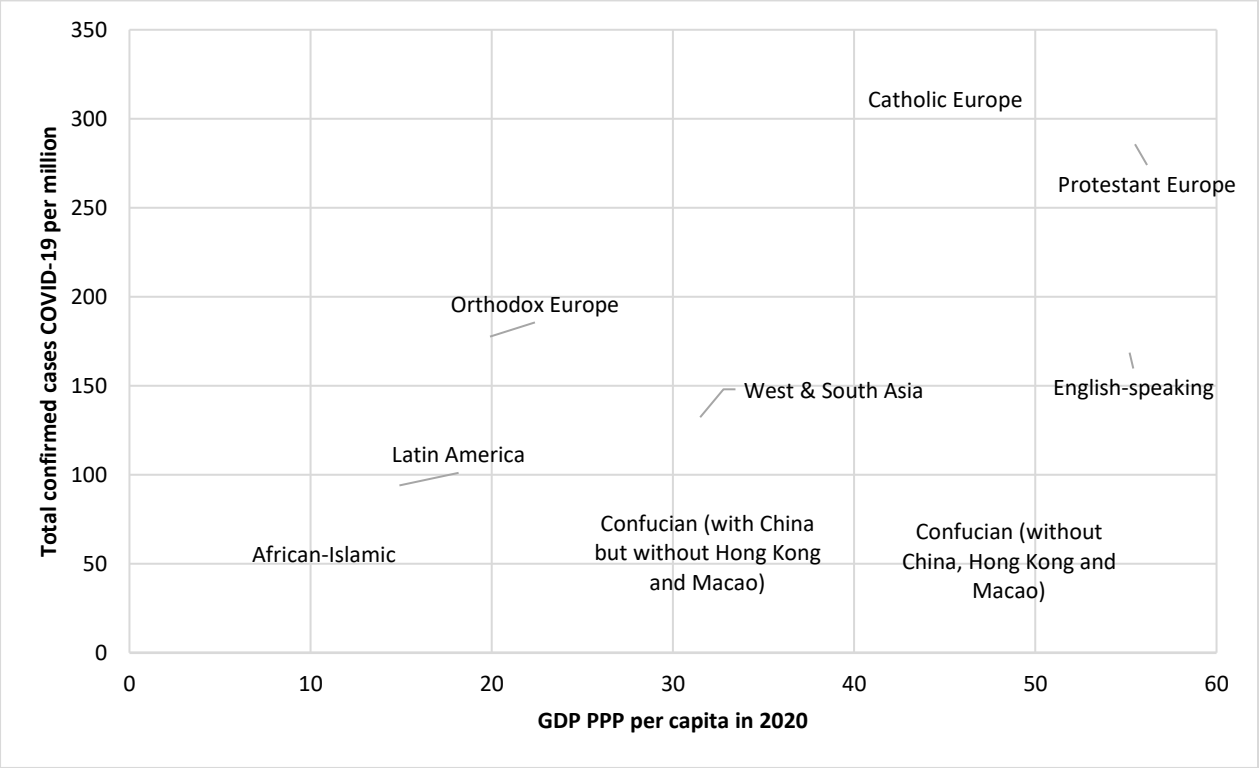

Chart 2. Average GDP PPP per Capita in 2020 (Constant 2017 Int$) and Group Average Total Number of Confirmed Cases of COVID-19 per Million (20 January 2020–28 February 2022)
Source: Authors' calculations based on data from the World Bank [n.d.] and the Global Change Data Lab [n.d.].

Chart 2 raises a number of questions for the observer: why, in Catholic and Protestant Europe, was the amount of patients with coronavirus infection higher relative to other groups? Perhaps one of the reasons lies in the age of people in this group. A case in point is that Sub-Saharan Africa or the African-Islamic Inglehart group has the lowest number of infected

patients as this group has the youngest population, the average age of which (in Africa) is 19-20 years [Mennechet, Takoudjou Dzomo, 2020]. During the coronavirus pandemic, people over the age of 60 fell ill more often because of weakened immunity and an increased risk of infection [Ibid.]. Another possible reason mentioned earlier is that these countries have already experienced lockdowns during other epidemics and, therefore, managed to reduce the COVID-19 confirmed cases effectively.

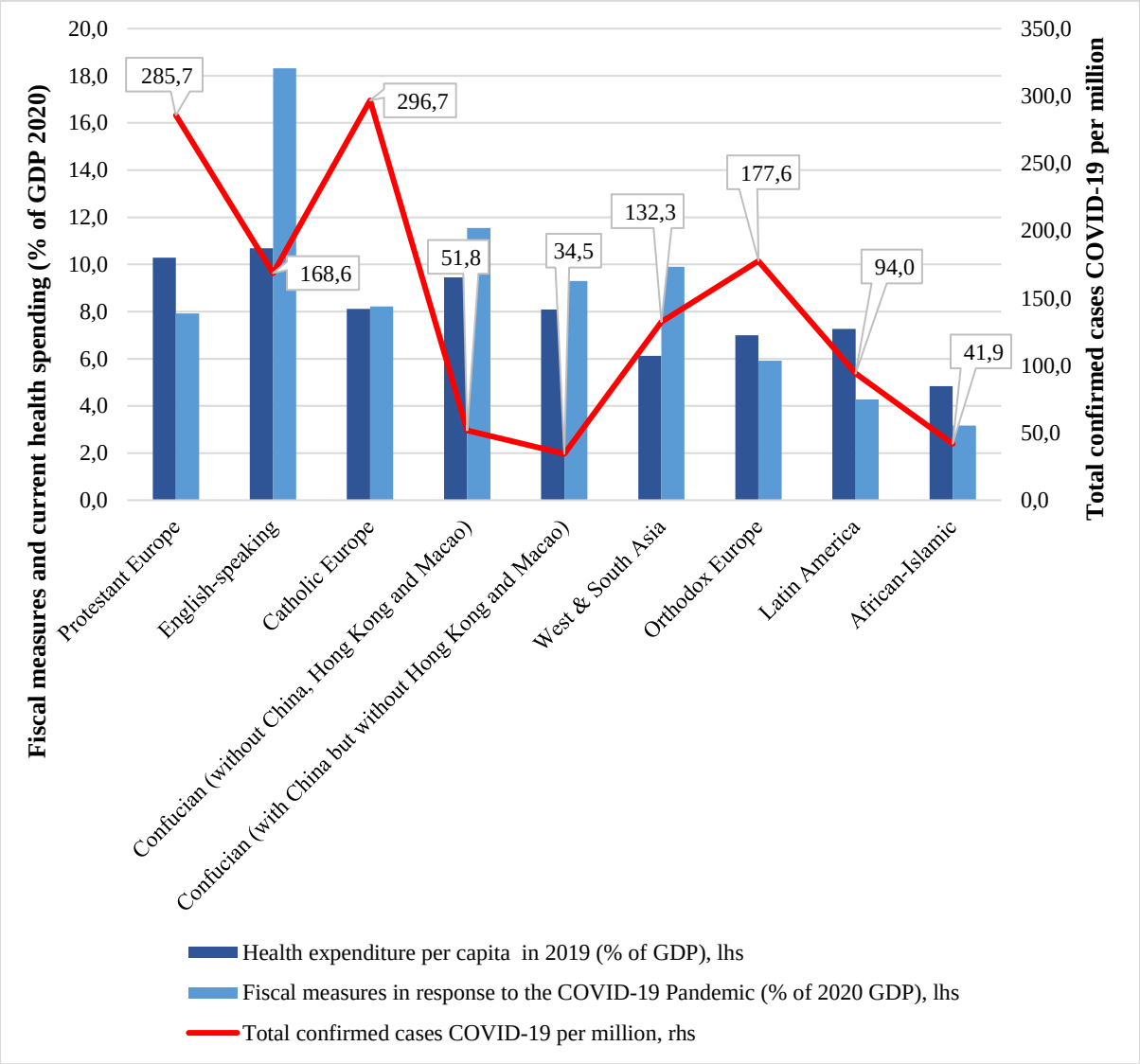

Chart 3. Group Average of Total Number of Confirmed Cases of COVID-19 per Million (20 January 2020–28 February 2022) (Right Axis) and Average Fiscal Responses, per Capita Health Spending of All Economic Agents (Left Axis)

Source: Authors' calculations based on data from the World Bank [n.d.], the IMF [2020], and the Global Change Data Lab [n.d.].

The reaction of countries' groups, which was aimed at limiting the recession in the form of fiscal incentives, naturally reflects the financial capabilities of countries [Grigoriev et al., 2021]. In Chart 3, it is worth paying attention to the scale of funds injections as a fiscal response to the threat compared with the level of spending on healthcare of all economic agents in 2019—the most enormous excess was in the English-speaking countries in Asia. The accumulation of debt from official external sources can help states to emerge more smoothly

from the recession caused by the coronavirus outbreak [Calderon, Kubota, 2021]. For example, significant support was provided to African countries in 2020: the Organisation for Economic Co-operation and Development (OECD) worked with African countries to maximize revenue collection and develop tax policies as a fiscal response to the challenge of COVID-19 [OECD, 2021]. The World Bank and the IMF provided financial assistance to nearly 100 low-income countries [U.S. Global Leadership Coalition, 2021]. The parameters of the pandemic in Africa might have been worse without this aid.

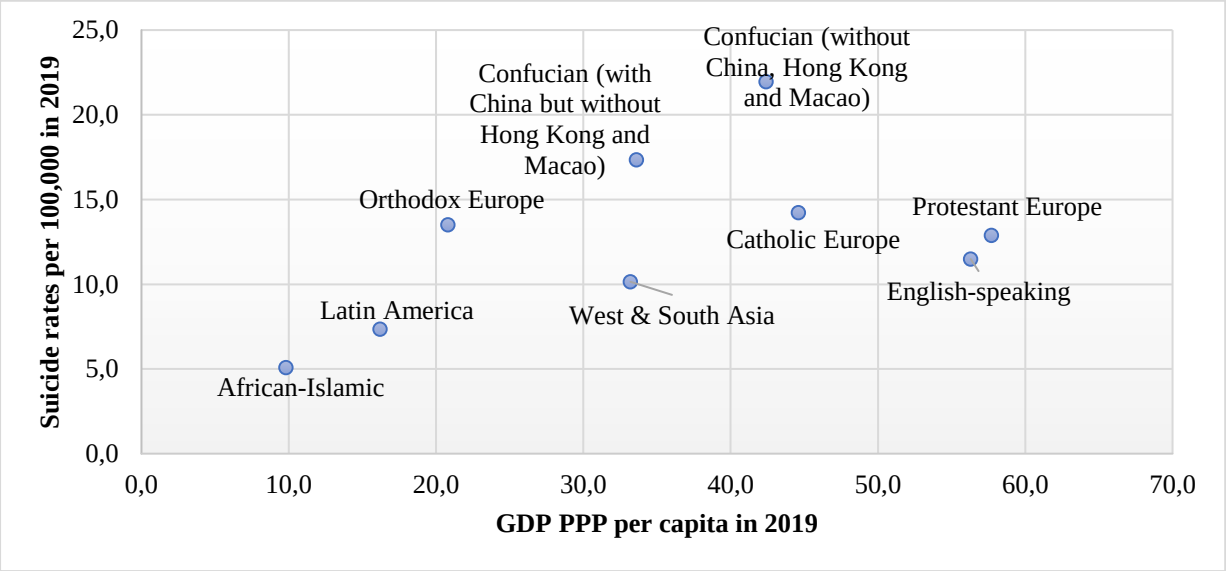

Chart 4. Average Suicide Rate per 100,000 in 2019 and GDP PPP per Capita in 2019 (Constant 2017 Int$)
Source: Authors' calculations based on World Bank [n.d.] data.

In Chart 4, an attempt was made to analyze the correlation between the suicide rate and the Inglehart classification group. The logic of the connection between the country's level of development and suicide rates is present. However, it may reflect a higher level of development (a social rather than a cultural phenomenon), as was shown in a recent work [Grigoryev, Popovets, 2019]. The graph reveals that the Confucian group (both with and without China) lags behind the top three wealthiest groups in terms of GDP per capita (English speakers, Catholics, and Protestants) but unexpectedly outperforms everyone else in terms of suicide rates. For the naive (without special knowledge) observer, this is contrary to the calm that this religion teaches.

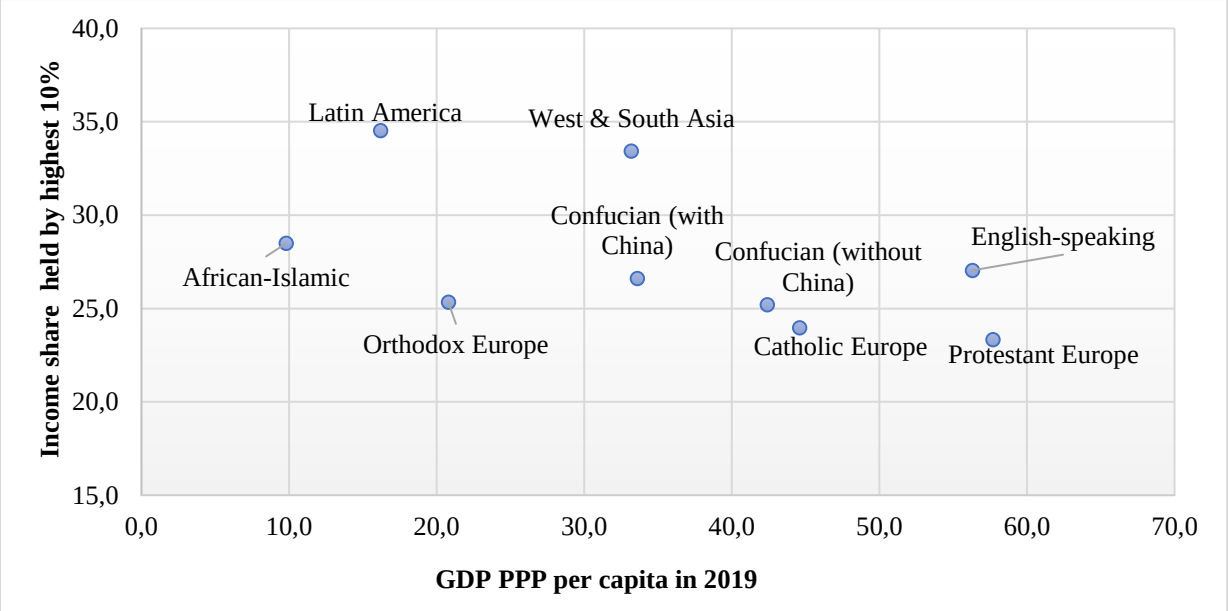

Chart 5. Average Share of Income Owned by the Top 10% (Latest Year Available) and GDP PPP per Capita in 2019 (Constant 2017 Int$)
Source: Authors' calculations based on World Bank [n.d.] data.

Chart 5 demonstrates a graphical interconnection between the wealth of the population and the proportion of affluent people. Thus, the eternal problem of the ratio between the level of development and social inequality in the language of sociocultural codes receives an unexpected "shade." Without regard to religion, Anglo-Saxons and representatives of Latin America have the highest indicators of inequality [Grigoriev et al., 2022, Ch. 14].

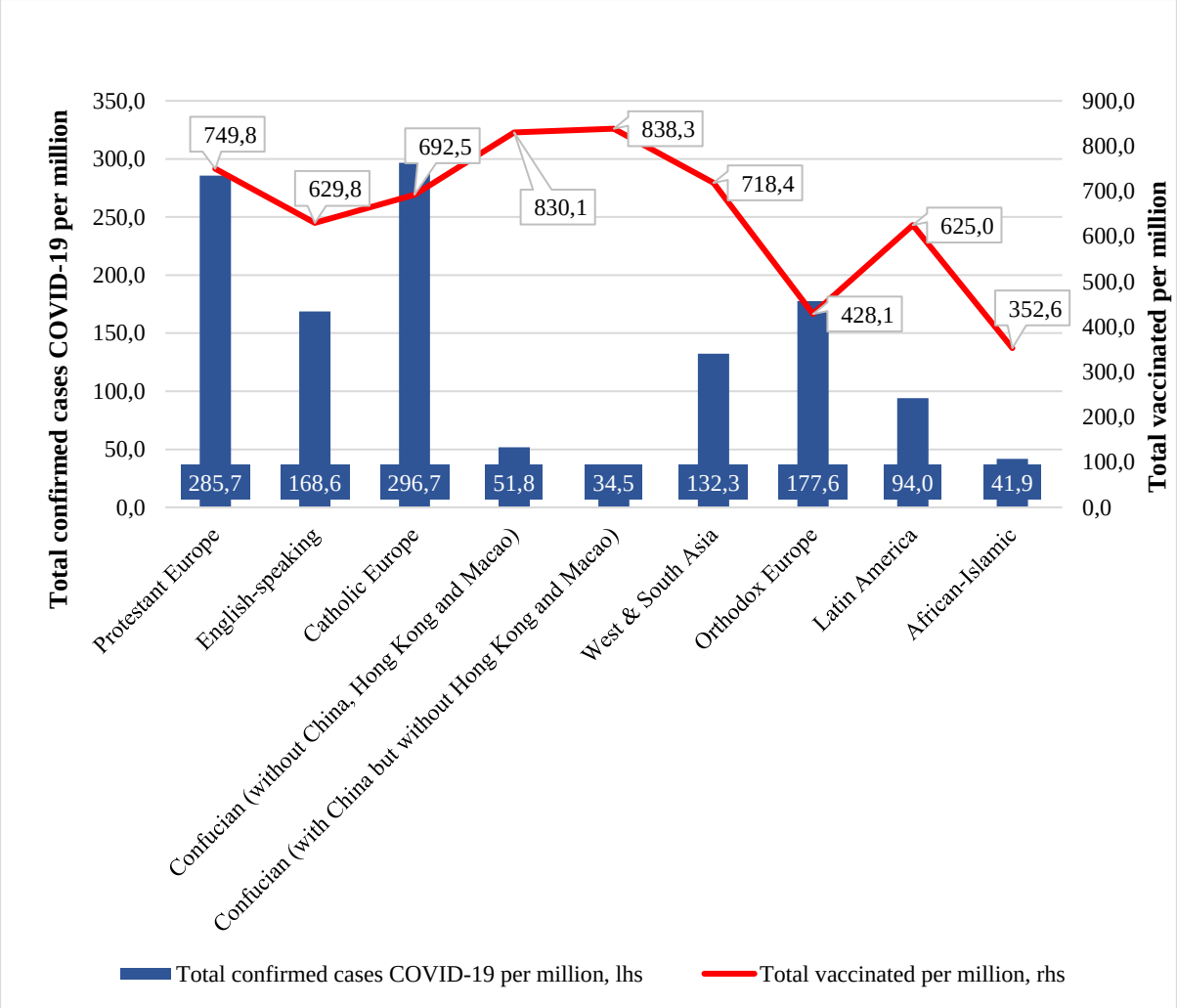

Chart 6. Group Mean Number Vaccinated per Million, Latest Available Date (February 2022) (Right Axis) and Total Number of Confirmed Cases of COVID-19 per Million (20 January 2020–28 February 2022) (Left Axis)

Source: Authors' calculations based on the Global Change Data Lab [n.d.].

Interpretation of the correlation between morbidity and vaccination should include transmission mechanisms such as public health from the social side, as well as trust in government and discipline. As can be seen, tremendous success is observed in the Confucian, Southwest Asian, and even Afro-Islamic world if we consider the relatively low COVID-19 confirmed disease cases. The hypothesis is that implementing government instructions in groups with traditional views and less freedom of expression could cause less exposure to the pandemic, in any case, should be further studied. Catholic and Protestant countries had the same incidence pair with very different vaccination levels. They were probably late in vaccination since these two groups had the highest number of COVID-19 confirmed cases (Chart 6). The correlation of vaccination rates across 80 countries with the survival-expression values is relatively high at 0.6 (see Table 2). Of course, we take into account that this is not a direct causal interconnection, but it is an indication of the need for further search for factors due to which the more developed countries suddenly found themselves at a critical moment in a worse position.

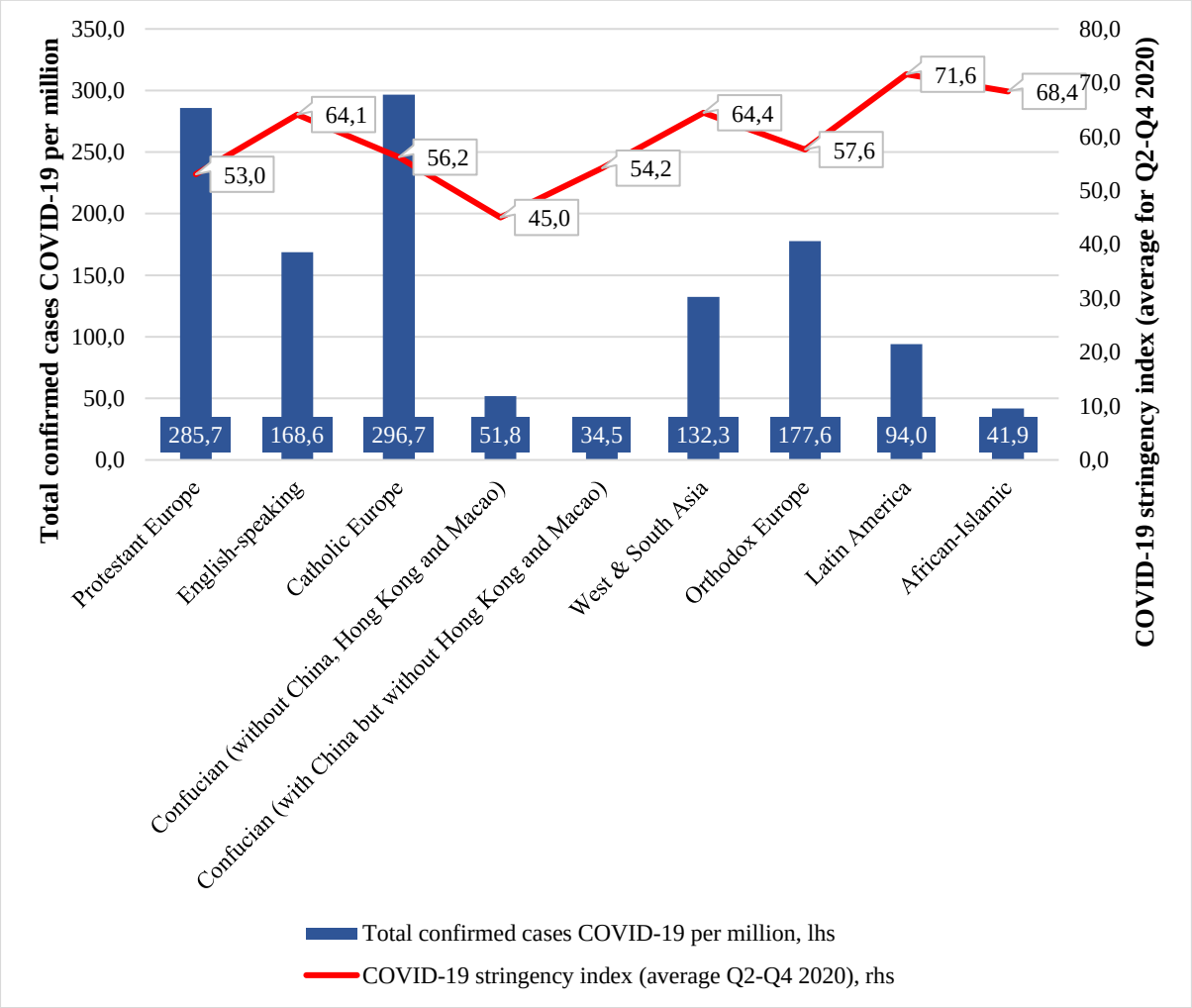

Chart 7. Average Lockdown Severity (COVID-19 Stringency Index) (Right Axis) and the Average Total Number of Confirmed COVID-19 Cases per Million (20 January 2020–28 February 2022) (Left Axis)
Source: Authors' calculations based on Global Change Data Lab [n.d.].

The interdependence between the confirmed cases and the severity of lockdowns remains unclear and requires further investigation. The general observation is that lockdowns helped Protestants and Catholics less during the acute period of 2020 than most other groups (Chart 7).

The picture of social indicators calculated based on simple averages between the countries of the Inglehart and Welzel groups, first, makes one wonder about the diversity of the world and the diversification of the links between the social parameters of countries and the quantitative indicators of the coronavirus pandemic.

The Quantitative Relationship Between Pandemic Parameters and Sociocultural Codes

A great deal of statistical, and particularly correlation and regression, analyses have been carried out in this study. We have reduced the presentation volume of the selected indicators to the basic parameters in the correlation matrices to identify the major interconnections with clarity. We left only three independent variables in the regression analysis: suicide in 2019 as

a persistent problem (and an association with the parameter level during the pandemic), the confirmed cases of coronavirus, and vaccination from March 2020 to February 2022. We are far from having answers to all or many of the questions that arise. However, we want to illustrate the relevance of using the Inglehart and Welzel survey statistics to analyze the social problems of the modern world.

As a practical basis, indicators are considered for 94 countries from the following sources: the World Bank, the Global Change Data Lab, the World Values Survey, and the UN. The following variables were selected for regression analysis: GDP per capita at PPP 2017; inequality, expressed as the proportion of the top 10% of the total wealth in 2019; the median age of the population in 2019; the number of suicides per 100,000 in 2019, and the coordinates of the Inglehart map.

To analyze the relationship between cultural property and the 2020 pandemic, several variables are considered: total confirmed cases of COVID-19 per million from 20 January 2020 to 28 February 2022 and the number of people vaccinated against COVID-19 up to February 2022.

In a previous study, 157 countries, which account for 98% of world GDP, were divided into seven clusters according to the level of GDP per capita at PPP, where cluster 1 is the most developed countries and cluster 7 is the least developed [Grigoriev, Parshina, 2013]. Unfortunately, data on sociocultural codes are only available for 94 countries, so we cannot repeat the analysis on the same sample. This study considered 48 countries from clusters 1–2 and 46 countries belonging to clusters 3–6. Thus, our research is limited to the more developed part of the world community—this is an intermediate case between the conditionally "general" population (157 countries) and the non-random "sample" of 80 countries in the regression analysis.

Groups of countries were compiled according to the following principle:

- groups of states were used based on the preliminary Inglehart map for the 7th wave of the survey (2017–20);
- Ireland and Canada were added to the English-speaking group (Inglehart map, wave 6, 2010–14);
- further, only those countries included in the clusters in our previously mentioned work were selected, and countries for which there are no available statistics were excluded.

As a result, eight groups of countries were formed (Table 2)

Table 2. Interrelation Between Country Groups and the Clusters

Group of Countries in this Study	Corresponding Cluster From the Previous Study [Grigoriev, Parshina, 2013]
English-speaking countries	1
Protestant Europe	1
Catholic Europe	1-2
Confucian countries	1, except China (China in cluster 3)
South & West Asia	1–4
Orthodox Europe	2-4

Latin America	2–4 and Nicaragua from cluster 5
African-Islamic	4–6

Source: Compiled by the authors.

For the practical part of the assay, 80 countries were selected for which all the considered social indicators were available.

Correlation analysis by country has its advantages and its drawbacks: for example, it does not consider the unevenness of countries in terms of population size. In our case, we are concentrating on 80 countries (Appendix 2), which are home to the vast majority of the world's population and produce most of its GDP. In essence, this set of states is closer to the general population than to a large sample. Accordingly, the indicators of Tables 1 and 2 can be considered as stylized facts that theories must explain.

Some correlations have high estimates and confirm observers' expectations "about the nature of things." In this respect, the correlation of 0.83 between median age and "Inglehart Values: from Traditional to Secular-Rational" indicates the world's rationality: the higher the secular-rational values on the scale, the higher the average age in the country. The level of GDP per capita correlates well with the values of the scale of survival-self-expression (0.77): the higher the well-being of the population, the higher the values of self-expression; the scales of traditional and secular-rational values correspond well with suicide (0.63): the higher the secular-rational values, the greater the suicide rate.

Table 3. Correlation Matrix

For 80 countries[5]	Confirmed cases	Log of confirmed cases	Mortality from COVID-19	Log mortality from COVID-19остм от COVID-19	GDP per capita 20192019	Log of GDP per capita 2019	Suicides 2019	Inequality (top 10% share of wealth) in latest	Vaccination	Inglehart values: from survival to self-expression	Inglehart values: from traditional to secular-rational	Median age 2019	Health expenditure 2019
Confirmed cases	1												
Log of confirmed cases	0.78	1											
Mortality from COVID-19	0.47	0.57	1										
Log mortality from COVID-19	0.53	0.85	0.82	1									
GDP per capita 2019	0.64	0.56	0.10	0.24	1								
Log of GDP per capita 2019	0.71	0.70	0.31	0.44	0.90	1							
Suicides 2019	0.38	0.38	0.24	0.25	0.39	0.48	1						
Inequality (top 10% share of wealth) in latest available year	-0.39	-0.27	-0.06	-0.06	-0.35	-0.36	-0.21	1					
Vaccination	0.39	0.37	-0.02	0.14	0.57	0.63	0.26	-0.01	1				
Inglehart values: from survival to self-expression	0.55	0.42	-0.06	0.08	0.77	0.71	0.29	-0.24	0.60	1			
Inglehart values: from traditional to secular-rational	0.60	0.51	0.25	0.26	0.63	0.75	0.63	-0.44	0.49	0.57	1		
Median age 2019	0.67	0.64	0.49	0.48	0.66	0.82	0.57	-0.47	0.54	0.53	0.83	1	
Health expenditure 2019	0.51	0.52	0.30	0.36	0.52	0.59	0.31	-0.05	0.44	0.63	0.52	0.56	1

Source: Authors' calculations based on World Bank [n.d], the IMF [2020], and the Global Change Data Lab [n.d.].

[5] The list of countries is presented in Appendix 2

In addition, a simple linear regression analysis was performed. The resulting equations are in the nature of a basic relationships express assay. More complete modelling requires much more detailed information (massive microdata over a wide range of countries) and correspondingly more advanced econometric techniques, so the coefficients of the resulting equations need to be interpreted with caution, but we will take this risk.

Previously, +2 was added to the Inglehart coordinate values to work only with positive numbers. In other words, the coordinates previously considered in the interval [-2; 3] became [0; 5]. We would like to append that this modification does not affect the signs and significance of the regression coefficients or the overall correlation but changes their dimension.

Equation 1. Suicide rate in 2019

Table 4. Linear OLS Regression Results for the Suicide Rate as Dependent Variable

Dependent variable: Suicide_2019	Coefficient	*t*-statistic
Ingelhart_survival	–0.54	–1.00
Ingelhart_traditional	4.77	6.53
_cons	2.93	2.22
R^2	0.41	
N	80	

Note: See Appendix 3 for variables' description
Source: Authors' calculations.

The indicator "Inglehart Values: From Traditional to Secular-Rational" illustrates the scale of "traditions and secular-rational values." Therefore, when the sign is positive, the movement occurs in the direction of secular-rational values. In other words, the higher the secular-rational values, the more suicides. Otherwise, if the sign of the indicator "Inglehart Values: From Traditional to Secular-Rational" were negative, then the conclusion would be the following: the higher the traditional values, the fewer suicides. The likelihood of such a situation is observed in previous studies on social factors [Grigoriev, Popovets, 2019]. The indicator "Inglehart Values: From Survival to Self-Expression" was insignificant.

In this case, we have a picture of sociocultural codes which requires careful interpretation and further study. Since we know that the increase in suicide rates occurs in countries with a high level of GDP per capita and, possibly, is of a social nature, as an experiment, we present the values of the coefficients for both Inglehart scales.

Equation 2 COVID-19 confirmed cases per million

Table 5. Linear OLS Regression Results for the Logarithm of the Number of Confirmed Cases of COVID-19 as the Dependent Variable

Dependent variable: ln_cases	Coefficient	*t*-statistic
Ingelhart_survival	–0.35	–2.27
ln_gdp	1.36	6.56
Health_exp_2019_share	0.14	2.35
_cons	-2.41	-1.34
R^2	0.54	

N	80

Note: See Appendix 3 for variables' description.
Source: Authors' calculations.

Thus, from the above equation, we obtain the following observations, which, with some caution, can be interpreted as follows.

First, it follows from the equation that the logarithm of GDP per capita positively correlates with the logarithm of the number of people infected with COVID-19. A positive interconnection between the parameters also exists in the correlation matrix. Due to the massive potential of frequent international travel, there is a high probability among the middle and upper classes to catch the infection and transfer it to another region of the world. Conversely, the poorer the country, the fewer people get sick due to the lack of financial opportunities to cross borders.

Second, according to the results of the correlation matrix and the econometric equation, there is a direct ratio between the logarithm of the number of infected people and the share of healthcare spending: the higher the share of healthcare spending in a country, the more infected people in that country. This result can be explained by the fact that predominantly affluent states have more robust healthcare systems and invest more in medicine. This statement does not contradict the above conclusion about a positive relationship between the welfare of the country and the incidence rate. Thus, the richer a country is and the more it invests in the healthcare system, the more COVID-19 confirmed cases.

Third, there is a negative correlation in the regression between the number of infected people and the Inglehart value variable from survival to self-expression. The closer to the values of self-expression, the lower the number of detected cases of COVID-19 infection.

Equation 3 Vaccination

Table 6. The Results of the Linear OLS Regression for Number of Vaccinated per 1000 as the Dependent Variable

Dependent variable: vaccine_per_thousand	Coefficient	*t*-statistic
Ingelhart_survival	74.89	4.47
Median_age_2019	12.54	4.43
Inequality_latest	12.3	3.4
_cons	-365.98	-2,.8
R^2	0.504	
N	80	

Note: See Appendix 3 for variables' description.
Source: Authors' calculations

The formally obtained equation is interpreted as follows.

The parameter "Inglehart Values: From Survival to Self-Expression" describes the dual scale "survival-self-expression," therefore, when the coefficient for this indicator is positive, the movement occurs toward self-expression values, and in this case, it means that the higher the self-expression values, the more vaccinations there are. With the growth of individualistic

nature, the proportion of those vaccinated against COVID-19 increases. Perhaps the population of poorer countries, which are characterized by survival values and which are on the verge of transition from a pre-industrial economy to an industrial one, or the countries located in the lower left corner of the Inglehart map perceive the pandemic and the 2020 crisis as a problem for the survival of an industrial society and not as a problem of a post-industrial society, as a result of which the exit from the pandemic and vaccination activities differs.

Median age is positively correlated with vaccination rates. This is probably a manifestation of the presence of the third factor—the level of development of the country—associated with a higher median age and the availability of vaccines for wealthy older generations, and the proportion of such countries in the sample is high. It can be assumed that people more senior than the median age are more likely to be vaccinated than younger people because of the greater likelihood of catching the infection.

Hypothetically, we assumed an inverse relationship between the stratification of society and the proportion of those vaccinated. However, the econometric equation showed a positive relationship between the variables—rich countries are characterized by a significant degree of inequality plus the factor "Inglehart Values: From Survival to Self-Expression." In addition, in affluent societies, medical care, healthcare systems, and drug development are more advanced, which explains the direct relationship: countries focused on self-expression values are more guaranteed to be vaccinated against coronavirus infection.

Conclusions

This article covers three groups of factual content, which can be classified as follows: reliable observations (de facto-stylized facts); materials on the pandemic requiring further analysis, and conclusions on the role of sociocultural codes in the context of the 2020–21 pandemic.

Stylized facts include the statistical socioe-conomic characteristics of the Inglehart and Welzel groups, their correlation with each other, and with their scales (like a three-dimensional matrix). We believe that the high level of development of the three groups plays a significant role in their sociocultural attitudes, providing the opportunity for citizens of these countries to freely choose the path of self-realization, separation from survival, and traditional values. Although the interconnection is quite noticeable, we think it is worth working with both data types to analyze country behaviour. An interesting topic for future research remains the role of social inequality in the context of sociocultural codes and implications for social behaviour.

The second significant point is that we see the largely unexpected characteristics of the pandemic by group: the relative success of the Confucians (including or excluding China) and the somewhat bleak results of the rich Anglo-Saxon group in terms of limiting the effects of the pandemic. For further progress in quantitative analysis, more detailed statistics are needed and allow us to study the pandemic's impact and lockdowns on various social strata and national minorities.

Third, if the problems of the first two approaches are successfully described, it remains to isolate sociocultural effects not by large groups but by more structured social communities.

The calculations presented in this article indicate the following results: countries that are more advanced in the direction of self-expression values on the Inglehart scale show higher levels of vaccination and low incidence of infections; states oriented toward secular-rational

values show higher rates of suicide than countries with predominantly traditional views. By themselves, sociocultural codes, as well as indicators of inequality or the level of GDP per capita, cannot in any way determine the intensity of the disease, vaccination, or suicide rates in different countries in a particular year but they can indicate the issues to look at.

Sociocultural parameters have a special relationship with the parameters of the characteristics of the COVID-19 pandemic. The calculations show that the Inglehart scales can be used as independent variables and obtain interesting—even unexpected—coefficients for such variables as suicide rates and vaccination of the population in a sample of 80 predominantly developed countries of the world. Of course, we have not solved one of the most vexing problems of rising suicide rates in developed countries, but we have shown that the transition from traditional values to rational ones leads to an increase in the number of suicides or a movement from survival to self-expression. In any case, the obtained results require further research and a search for the causes—direct or indirect—of the looming directions of the impact of social and socio-psychological factors on the course of such an important process as the recent pandemic.

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Annex 1. Countries of the Inglehart and Welzel Map

Protestant Europe	**Confucianism**	**Latin America**
Germany	China	Argentina
Denmark	Hong Kong SAR	Bolivia
Iceland	Macau SAR	Brazil
Netherlands	Korea	Guatemala
Norway	Japan	Colombia
Finland	**African-Islamic Group**	Mexico
Switzerland	Azerbaijan	Nicaragua
Sweden	Albania	Peru
English-speaking countries	Algeria	Puerto Rico
Australia	Bangladesh	Trinidad
United Kingdom	Ghana	Uruguay
Ireland	Egypt	Philippines
Canada	Zimbabwe	Ecuador
New Zealand	India	**West & South Asia**
U.S.	Indonesia	Vietnam
Catholic Europe	Jordan	Israel
Austria	Iraq	Malaysia
Belgium	Iran	Singapore
Hungary	Kyrgyzstan	Thailand
Spain	Lebanon	Chile
Italy	Mali	South Africa
Lithuania	Morocco	**Orthodox Europe**
Luxembourg	Myanmar	Armenia
Poland	Nigeria	Belarus
Portugal	Pakistan	Bulgaria
Slovakia	Rwanda	Bosnia and Herzegovina
Slovenia	Saudi Arabia	Greece
France	Tanzania	Georgia
Croatia	Tunisia	Kazakhstan
Czech Republic	Turkey	Latvia
Estonia	Uganda	Moldova
	Ethiopia	Russia
		Romania
		North Macedonia
		Serbia
		Ukraine

Annex 2. Countries for Which Data Was Used in the Equations

Australia	Ireland	Rwanda
Austria	Iceland	Romania
Azerbaijan	Spain	North Macedonia
Algeria	Italy	Serbia
Argentina	Kazakhstan	Slovakia
Armenia	Canada	Slovenia
Bangladesh	China	U.S.
Belarus	Colombia	Thailand
Belgium	Kyrgyzstan	Trinidad
Bulgaria	Latvia	Tunisia
Bolivia	Lebanon	Turkey
Bosnia and Herzegovina	Lithuania	Ukraine
Brazil	Luxembourg	Uruguay
United Kingdom	Malaysia	Philippines
Hungary	Mali	Finland
Vietnam	Morocco	France
Ghana	Mexico	Croatia
Guatemala	Moldova	Czech Republic
Germany	Myanmar	Chile
Greece	Nigeria	Switzerland
Georgia	Netherlands	Sweden
Denmark	Nicaragua	Ecuador
India	Norway	Estonia
Indonesia	Pakistan	South Africa
Jordan	Poland	Korea
Iraq	Portugal	Japan
Iran	Russia	

Annex 3. Glossary

Index	Label used in the equations	Description	Source
Cases COVID-19	ln_cases	Total confirmed cases COVID-19 per million (from 20 January 2020–28 February 2022)	Global Change Data Lab
GDP per capita 2019	ln_gdp	GDP PPP per capita in 2019 (constant 2017 int$)	The World Bank
Suicides 2019	Suicide_2019	Suicide rate per 100,000 in 2019	The World Bank
Inequality (top 10% share of wealth) in latest available year	Inequality_latest	Income share held by highest 10% (data for the last available year)	The World Bank
Vaccination	Vaccine_per_thou-d	Total vaccinated per million for last available date (February 2022)	Global Change Data Lab
Inglehart values: from survival to self-expression	Inglehart_survival	Coordinate on the horizontal axis according to the Inglehart map. Note: +2 was added to the Inglehart coordinates, so that in the future it would be possible to work only with positive numbers: that is, the coordinates were [-2;3] and became [0;5]. Therefore, the movement toward the values of self-expression, i.e. the lower this indicator, the greater the bias of the country on the value of survival, the higher - on self-expression	World Values Survey. The Inglehart-Welzel World Cultural Map - World Values Survey 7 (2020)
Inglehart values: from traditional to secular-rational	Inglehart_traditional	Coordinate on the vertical axis according to the map of Inglehart Note: +2 was added to the Inglehart coordinates, so that in the future it would be possible to work only with positive numbers: that is, the coordinates were [-2;3] and became [0;5]. Therefore, the movement toward secular-rational values, i.e. the lower this indicator, the greater the	World Values Survey. The Inglehart-Welzel World Cultural Map - World Values Survey 7 (2020)

		bias of the country on the values of tradition, the higher - on secular-rational	
Median age 2019	Median_age_2019	Median age of the population in 2019	The UN
Health spending 2019	Health_exp_2019_share	health spending (% of GDP) in 2019	The World Bank