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Health, Longevity, Infrastructure and Competitiveness: The Four Horsemen of COVID-19

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Abstract

Many researchers around the world are working to reach a general framework to provide solutions for COVID-19 in different ways. From our economic and business orientation, "Health, Longevity, Infrastructure and Competitiveness" are presented in this paper as the Four Horsemen of COVID-19. Our aim is to analyse the relationship between these proposed four factors and their influence on COVID-19.

Using the Global Competitive Index (GCI), Health Systems in Transition (HiT) and the System of Health Accounts (SHA), we complete a database for a total of 28 countries of the European Union, including the United Kingdom and using variables related to the environment of each region (competitiveness, security, infrastructure, population and health system). Our study is focused on a descriptive analysis and a binary logistic model (logit), trying to distinguish between countries with more and less incidence of COVID-19.

According to the results, the presence of these four factors – which are desirables for any country – implies a greater transmission of the virus in these regions. However, a higher annual expenditure in the health system is related to a lower incidence of COVID-19.

Keywords: competitiveness, infrastructure, health system, COVID-19.

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INTRODUCTION

The Four Horsemen of the Apocalypse – Death, Famine, War and Conquest – appear in the final book of the New Testament and represent four disasters that together could cause suffering for decades. This image is used in this paper in order to explain how COVID-19 is causing different consequences in each country. In this sense, four variables (health, longevity, infrastructure and competitiveness) and the relationship between them are analysed to explain the different impacts (human and economic losses) of this pandemic.

Several researchers around the world are working – from different perspectives – to understand the origin and behaviour of COVID-19 as well as its treatment/prevention and solutions. From our economic and business orientation, we are focused on the relationship between human and economic losses and the COVID-19 pandemic.

Momaya (2020) has recently published a study to rethink the fundamentals of economy, development and sustainability after COVID-19 using the classical method of situation–actor–process–learning–action–performance (SAP-LAP). He remarks on some issues related to the sustainability dimension of competitiveness and reflects on the impact of COVID-19 on micro, small and medium enterprises (MSMEs) and their environment (infrastructure, health system and longevity). His remarks are just the beginning of a new scientific and economic wave of rethinking our way of living and competing.

On the other hand, Kurbucz (2020) has recently presented a dataset to analyse the role of governmental, trade and competitiveness considerations in the formation of official COVID-19 reports. The international effort of building a homogeneous database is crucial to study, for example, the relationship between the air transport indicators of the Global Competitiveness Index (GCI) and the variable for the number of days since the first COVID-19 case.

With the "Competitive Advantage of Nations (CAON)" project of Porter (1990), a new perspective on competitiveness was shaped and some variables referring to the country's anatomy were included in a holistic framework of international understanding. The Diamond model of Porter was then debated, trying to compare international interfaces of competitiveness (Sölvell, 2015).

All these studies, as Momaya (2020) has recently proposed, need to be rethought after the COVID-19 crisis. A huge 'tsunami' is still occurring around the world and people, societies, institutions, businesses and markets are trying to advance in a new scenario. This paper seeks to understand the new framework after COVID-19 and the relationship between competitiveness, confirmed cases and deaths, health systems (population and size of cities) and infrastructures (public and shared transport).

Some of the questions which this paper tries to answer are: Are the most competitive European countries more resistant to COVID-19 infections? What pillars that sustain competitiveness most affect the spread of the virus? Are countries with a higher percentage of the aging population most affected? Is investment in health spending effective to curb the spread of COVID-19? What items of health expenditure are most significant?

This paper proceeds as follows: first, we discuss earlier work on health, longevity, infrastructure and competitiveness; second, the data and methodology are set out; next, we present and discuss our results; and finally, we draw some conclusions and explain the limitations of our research.

LITERATURE REVIEW

The aim of this paper is to analyse the relationship between the proposed four factors (Health, Longevity, Infrastructure and Competitiveness) of the regions and the presence of COVID-19. Likewise, we analyse whether there are differences in the behaviour of the variables on the health system and competitiveness of the countries with the highest incidence of COVID-19, both in terms of deaths and infections per thousand inhabitants.

Longevity, Health and Competitiveness

Aiginger et al. (2015) established two components of competitiveness: the structure of an economy, and its capabilities, for instance in terms of the innovation and education system. Both capabilities explain issues such as growth, market positions and GDP growth, especially in industrialised countries. In this framework, the role of governance to create synergies between private and public sector and to regulate this relationship is definitive to understanding the competitiveness concept and its outcomes (Acemoglu, 2003; Bouis et al., 2011). The European Commission (2001) defines these outcomes of competitiveness as “the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis”. In this sense, several indicators have been used to measure competitiveness and welfare. The “beyond GDP” debate (Stiglitz et al., 2009) has opened a new path to advance knowledge on the competitiveness indicator through other measures which contribute to well-being and longevity.

According to the American Hospital Association, American hospitals incurred more than $202 billion in losses between March 1st and June 30th. McKinsey & Company (2020) remarks that around 7.6 million jobs, or 24 percent of the UK workforce, was at risk in May 2020 because of COVID-19-related lockdowns. Evidence demonstrates that people and places with the lowest incomes are the most vulnerable but the impact of COVID-19 on places most competitiveness is bigger than others. Through these analyses, the proposed hypotheses are the following:

Hypothesis 1: A higher degree of competitiveness causes a lower incidence of COVID-19 in terms of deaths and infections.

Hypothesis 2: A greater pillar of competitiveness based on health presents a lower incidence of COVID-19 in terms of deaths and infections.

Infrastructure and Competitiveness

Schwab (2018) analyses the debate around a global index of competitiveness and presents the importance of the quality and extension of transport infrastructure (road, rail, water and air) and its utility to compete and prosper. Nowadays, the idea of a well-developed infrastructure, which facilitates the movement of goods, people and even information within a country and across borders, is definitive.

Authors such as Kabak et al. (2020), Arvis et al. (2018), Önsel Ekici et al. (2016) demonstrate that there is a positive relationship between transportation infrastructure and the competitiveness of a country.In this way, these opportunities for connecting, competing and growing faster globally are vulnerable to being badly affected by COVID-19. For that reason, we propose the following hypothesis:

Hypothesis 3: A greater pillar of competitiveness based on infrastructure presents a greater incidence of COVID-19 in terms of deaths and infections.

METHODOLOGY

Variables and Database

The Global Competitive Index (GCI) – supported by the World Economic Fund – has been used to determine the level of competitiveness of the regions. This index classifies a total of 141 countries according to a combination of 12 pillars related to the macroeconomic environment, the provision of resources for citizens, as well as business development policies. Specifically, for this study we have considered the pillars related to the enabling environment (1st pillar Institutions and 2nd pillar Infrastructure) and human capital (5th pillar Health).

The pillar related to institutions (Instit) considers elements such as the level of security in the region, public-sector performance, transparency or corporate governance, among others. The pillar related to the provision of infrastructure (below) in the region includes indicators related to the breadth, quality and efficiency of the transport network as well as the utility of the infrastructure. Finally, the fifth pillar refers to healthy life expectancy measured in years (health). This last indicator considers the incidence of diseases such as tuberculosis, the impact of HIV or infant mortality per thousand births. Other context indicators of the regions have also been selected from the Global Competitive Report, such as the population (millions) as well as the economic growth of the region, measured through the 10-year average annual GDP growth, expressed as a percentage (Var_GDP).

On the other hand, we have used Health Systems in Transition (HiT), prepared by the Observatory on Health Systems and Policies, as well as statistics from the System of Health Accounts (SHA) to determine the status of the different health systems in the countries of the European Union. The variables considered are: the country's population over 65 years as a percentage of the total population (Age), life expectancy at birth (birth), practising nurses per thousand inhabitants (nurses), expenditure on total health care as a percentage of GDP (Healtexp) and pharmacy expenditure as a percentage of GDP (pharmaexp).

Finally, the data of confirmed cases and the number of deaths caused by COVID-19 are recorded. The data has been extracted from the website of the World Health Organization (WHO). This organization presents the registration of data for the incidence of COVID-19, which facilitates comparison between countries. In this way, the number of confirmed cases (Infected) and the number of total deaths ('Death') registered on July 13, 2020 have been obtained. Both magnitudes are relativised per thousand inhabitants.

To determine the relationship between COVID-19 and the degree of competitiveness of the regions and the state of their health systems, their value in 2019, the latest year available, has been considered for the latter. This temporal difference favours the explanation of causal relationships between the variables. Complete data have been obtained for all variables for a total of 28 countries of the European Union, including the United Kingdom.

Statistical model

This paper presents a descriptive analysis of the previous variables as well as the partial correlations between them. On the other hand, the different countries will be represented in a matrix to analyse the relationship between competitiveness and COVID-19. Two new relativised variables are presented as follows:

$$Infected\ relative\ x = (Infected\ Country\ x)/(Median\ Infected\ European\ Union\ 28)$$

$$Deaths\ relative\ x = (Deaths\ Country\ x)/(Median\ Deaths\ European\ Union\ 28)$$

If the value of the ratio exceeds 1, it indicates that the incidence in that region is higher than the average. If it is below 1, it indicates an incidence below the average level. These variables have been converted into dummy variables to identify a higher or lower incidence of the virus within the country. With these categorical variables (taking the value 1 if there is a higher incidence of the virus over the European average and taking the value 0 if the incidence is lower), we will analyse whether there are statistically significant differences between the variables. This approach will use the non-parametric test of the Kruskal-Wallis contrast and only two groups are going to be compared, using a significance level of 5%.

Finally, a binary logistic model (logit) is proposed to see which are the variables that most contribute to a greater presence of COVID-19 in the countries (the independent variable is associated with the incidence of COVID and the dependent variables are associated with the pillars of the competitiveness of the regions and the variables of the different health systems).

$$Y_i = f(Z_i) + \varepsilon_t \quad i = 1 \ldots\ldots n, \text{ where } Z_i = \beta_1 + \beta_2 X_{2i} + \ldots\ldots + \beta_k X_{ki}$$

And according to the values of independent variables $x_2, \ldots.., x_k$, the probabilities of the dependent variable was 1 and 0 are:

$$Pr(Y = 1 \setminus x_2, \ldots.., x_k) = E\ (Y_i \quad \setminus X = x) = \frac{e^{z_i}}{1 + e^{z_i}};$$

$$Pr(Y = 0 \setminus x_2, \ldots.., x_k) = 1 - \frac{e^{z_i}}{1 + e^{z_i}} = \frac{1}{1 + e^{z_i}}$$

The GCI variable is not considered as an independent variable because it is an aggregation of the different pillars that make up the competitiveness of a country. This would avoid the collinearity of the competitive variable with the rest of the variables.

$$\text{Infected relatived} = \alpha + \beta_1 \cdot VarGDP + \beta_2 \cdot Health + \beta_3 \cdot Insti + \beta_4 \cdot Infra + \beta_5 \cdot Healtexp + \beta_6 \cdot Pharmaexp + \varepsilon_t$$

$$\text{Deaths relatived} = \alpha + \beta_1 \cdot VarGDP + \beta_2 \cdot Health + \beta_3 \cdot Insti + \beta_4 \cdot Infra + \beta_5 \cdot Healtexp + \beta_6 \cdot Pharmaexp + \varepsilon_t$$

Results

Table 1 presents the descriptive values of the variables used in the study, as well as the mean and the standard deviation for the group of countries of the European Union-28. Thus, Germany stands out with 82 points out of a maximum of 100 in the GCI; and, on the opposite side, Croatia with 62 points out of 100. In the last ten years, European regions have experienced average growth of their GDP close to 1.8%, highlighting the great growth experienced by Ireland and Malta with growth above 5% on average. Regarding the different pillars that sustain the competitiveness of the regions, Spain stands out in the Health pillar with a valuation in this index of 72.1 points and Latvia with 64.3 below the average. However, there are more significant differences between the countries when considering the pillars related to the quality of the institutions and the level of development of the infrastructures, with differences greater than 9 percentage points.

The case of the Netherlands stands out above the average value and Romania with the lowest values of all the countries considered. On the other hand, if the variables relating to the state of the health systems of the countries are considered, the Netherlands stands out positively with the highest number of nurses per thousand inhabitants and the highest health expenditure in percentage terms of GDP. On the contrary, there are countries such as Greece and Bulgaria with just four nurses per thousand inhabitants and values below the European average in terms of health spending. Finally, in terms of pharmaceutical spending, the average value stands at 1.58% of GDP with a better variability between countries, standing out above the average for Bulgary.

Table 2 shows the existing correlations between the different variables under study and their level of statistical significance. Thus, the level of competitiveness of the country is positively correlated with the incidence of COVID-19, as well as with life expectancy at birth and the provision of health services at an economic and personal level. However, there is a negative relationship with respect to annual pharmacy spending. It also highlights the negative relationship that exists between the average growth of GDP in the last ten years with the pillars of competitiveness in health and infrastructure, as well as with life expectancy and the percentage of GDP in health spending. This is due to the European convergence that has occurred in the last decade, since the countries that were most affected by the last economic crisis were countries in low positions of the GCI and with a more balanced population pyramid than the large European economies. When considering the relationship between the different pillars that make up total competitiveness, there is a direct effect between the two, that is, the higher the quality of the institutions, the greater the development of infrastructure and investment in health systems.

As regards incidence of COVID-19, there is a high correlation between infections and deaths, as well as with life expectancy, which shows the greater impact of COVID-19 in regions with the highest quality and life expectancy. Likewise, for the variable of infections per thousand inhabitants, a negative relationship is found with the variable percentage of GDP in pharmacy. There is also a negative relationship between pharmacy spending and the number of nurses per thousand inhabitants, which shows the substitution relationship that may exist within the different items that make up annual health spending. Regarding the total expenditure on health, a positive relationship is seen with the percentage of the population over 65 years of age.

Figure 1 is presented to analyse in depth the relationship between the GCI and the incidence of COVID-19 in the different European countries. The left side of the graph shows the relationship between the score achieved by the country in the GCI and the relative position with respect to the average of the number of infected by COVID-19 in the country. It can be seen that there is a quadratic relationship of the third degree (R-Squared: 0.508), with a higher incidence of COVID infections as the country presents a greater degree of global competitiveness, up to a certain level of competitiveness. With a GCI close to 65, the incidence of those infected is well below the European average (Greece, Latvia, Croatia). From this IGC, the intensity of the number of infections increases until reaching the highest number of infections, doubling the European average (Spain, Italy, Ireland). From the GCI above 80, the trend reverts, reducing the level of infections (Germany, Finland, Denmark).

On the other hand, on the right side of the graph, the GCI health pillar is highlighted with the number of deaths from COVID-19 per thousand inhabitants. In this case, a quadratic relationship can be seen (R-Squared: 0.362) so that the number of deaths grows exponentially as the country presents a higher value in the pillar related to health. The cases of Spain, Italy, Sweden and France stand out.

If the different variables are analysed according to the highest incidence of the mean, a clear pattern of the characteristics of the most affected countries can be obtained (see Table 3). Thus, both in the case of higher mortality and higher level of infections, the statistically significant variables are:

a) the GCI, which is on average up to ten points higher in those countries with the highest number of deaths and infections per thousand inhabitants;

b) the competitiveness pillar based on health, where the countries with the greatest impact of COVID-19 have a valuation of more than three percentage points;

c) the pillar of competitiveness based on institutions, with an average score of 71 points in the most affected countries compared to a score of 63 in the least affected;

d) the pillar of competitiveness based on the development of infrastructure with a valuation six percentage point higher in the countries with the highest number of cases of the virus;

e) life expectancy at birth is another determining variable, being four percentage points higher in the most affected countries;

f) the number of nurses per thousand inhabitants is slightly higher in the case of the most affected countries, and finally;

g) the countries most affected by the virus devote 1.5% more to total annual spending on health as a percentage of GDP. However, there are no statistically significant differences in the variables related to the average economic growth of the country in recent years, the percentage of the total population over 65 years of age and the percentage of GDP devoted to pharmacy spending.

Finally, the effect of all variables is taken into account, considering two Logt models: the dependent variable is the incidence of COVID-19 – both at the level of deaths and at the level of infections – (taking a value of 1 if the country has a number of cases higher than the European average and 0 otherwise) and the independent variables, those related to the pillars of competitiveness and investment in healthcare spending. For both models (see Table 4), the same variables are significant except for the one relative to the average growth of GDP during the last decade, which is not significant at 5% in the case of the level of contagion. In order to predict the greater probability of having deaths per thousand inhabitants, the variation in GDP growth is significant, and there is a direct relationship. There is also a direct relationship with the pillar related to health and the development of infrastructure. Specifically, the greater the competitiveness of the region based on health, there is twice the probability of having deaths from the virus and three times the probability the greater the country's infrastructure and transportation endowment.

There is also a negative relationship with investment in healthcare spending. In the case of infections, the variables that are significant are as in the case of deaths, but with less intensity. Thus, the probability of having more infections per thousand inhabitants is close to 1.5 times higher in countries with greater development of infrastructure and higher quality and life expectancy. There is also a negative relationship regarding health spending, since the higher the spending on it, the lower the probability of having infections, specifically the relationship is three times less likely.

CONCLUSIONS AND LIMITATIONS

According to the results, the first and second hypotheses are rejected but the third is accepted. The higher level of competitiveness of a country presents a greater impact of the pandemic. Competitiveness implies dynamism in terms of the provision of infrastructure, business fabric and provision of services to citizens, which would help a greater transmission of the virus in these regions. However, higher annual expenditure allocated to the health system leads to a lower incidence of COVID-19.

This paper presents two noteworthy limitations: the first is due to the geographical dimension because the virus is spread around the world. The comparison with countries beyond Europe would mean a change in the results associated with competitiveness, especially if Latin American and African countries are considered. The difficulties in that case would come from the availability of data associated with health systems. However, this European study provides a stable framework of the environment and institutions, which allows the viability of comparisons. The second limitation of the study is the time dimension that focuses on a specific moment of the pandemic, coinciding with the end of the first wave in European territory. In future investigations, the study should be replicated later to see if the acceptance of the hypotheses raised changes. This paper is a first approximation to this new global framework after the COVID-19 where the response of each country to the virus would be related to factors such as health, longevity, infrastructure and competitiveness.

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Table 1. Descriptive indicators of the European Union countries according to competitiveness and incidence of COVID-19.

Country	*GCI*	*Var_GDP*	*Health*	*Instit*	*Infra*	*Infected*	*Deaths*	*Age*	*Birth*	*Nurses*	*Healtexp*	*Pharmaexp*
Germany	82	1.8	69.5	72.4	90.2	2.48	0.11	20.6	81.0	11.3	11.3	1.60
Austria	77	1.4	70.4	73.5	89.0	2.21	0.08	17.7	81.0	7.8	11.1	1.30
Belgium	76	1.2	69.6	69.5	87.3	5.64	0.88	17.1	80.5	9.5	10.9	1.80
Denmark	81	1.4	69.6	77.4	87.1	2.35	0.11	17.1	80.1	15.4	11.0	0.70
Spain	75	0.8	72.1	65.1	90.3	5.44	0.61	17.2	82.5	5.2	9.4	1.60
Finland	80	1.0	69.8	81.2	83.4	1.35	0.06	17.8	80.7	10.3	9.1	1.20
France	79	1.2	71.7	70.0	89.7	3.17	0.46	18.7	82.2	8.7	11.6	1.80
Greece	63	-2.2	69.9	50.5	77.7	0.34	0.02	19.5	80.7	3.3	9.3	2.60
Ireland	75	5.6	70.4	73.0	77.0	5.57	0.38	11.1	81.0	12.2	8.9	1.60
Italy	72	0.2	71.9	58.6	84.1	4.07	0.59	20.3	82.3	6.3	9.2	1.50
Luxembourg	77	2.5	69.7	75.9	85.0	9.68	0.22	13.9	81.5	11.9	7.1	0.70
Netherlands	82	1.3	70.2	78.6	94.3	3.04	0.37	15.9	81.2	11.8	12.1	1.10
Portugal	70	0.4	70.1	65.4	83.6	4.40	0.16	19.2	80.5	6.1	10.2	1.80
United Kingdom	81	1.7	69.3	74.4	84.0	4.55	0.70	16.6	81.1	8.2	9.3	1.00
Sweden	81	2.3	70.9	75.2	84.0	7.80	0.58	18.3	81.8	11.1	9.6	1.10
Poland	69	3.1	66.8	56.4	81.2	0.97	0.04	13.6	76.9	5.5	6.8	1.40
Romania	64	2.6	64.7	58.1	71.7	1.62	0.09	14.9	73.8	5.2	3.8	1.40
Czech Republic	71	2.0	67.4	60.9	83.8	1.25	0.03	15.9	78.2	8.1	7.5	1.60
Hungary	65	2.1	65.8	55.7	80.7	0.43	0.06	19.5	75.0	6.3	8.0	2.60
Bulgaria	65	2.0	64.9	56.8	71.3	0.98	0.04	18.7	74.3	4.2	7.2	2.80
Slovakia	67	2.8	66.3	56.3	78.6	0.35	0.01	16.6	76.2	6.0	8.1	2.10
Croatia	62	0.7	67.4	51.8	78.2	0.85	0.03	12.8	77.3	5.3	7.8	1.55
Lithuania	68	3.0	64.3	63.3	77.0	0.62	0.03	16.3	73.6	7.0	6.9	1.90
Slovenia	70	1.5	68.7	63.4	78.1	0.87	0.05	16.6	80.2	8.2	9.4	1.80
Latvia	67	2.5	64.6	59.3	76.0	0.59	0.02	17.4	73.7	4.7	6.5	1.50
Estonia	71	3.2	67.0	70.2	75.8	1.55	0.05	17.1	76.5	6.2	5.9	1.30
Cyprus	66	0.6	70.7	64.0	74.9	1.13	0.02	17.2	81.7	4.9	7.3	1.30
Malta	69	4.8	69.8	61.3	75.0	1.69	0.02	16.1	81.0	6.5	9.1	1.55
Medium	*72.32*	*1.84*	*68.70*	*65.65*	*81.75*	*2.68*	*0.21*	*16.92*	*79.16*	*7.76*	*8.73*	*1.58*
Stand. Dev.	*6.41*	*1.46*	*2.34*	*8.63*	*6.04*	*2.40*	*0.25*	*2.21*	*2.96*	*2.95*	*1.94*	*0.51*

Source: Own work from data of GCR (2019), WHO (2020) and SHA (2019).

Table 2. Matrix of correlations between competitiveness variables, Health Systems and COVID-19.

	Var_GDP	*Health*	*Instit*	*Infra*	*Infected*	*Deaths*	*Age*	*Birth*	*Nurses*	*Healthexp*	*Pharmaexp*
GCI	-0.08	***.493****	***.889****	***.780****	***.722****	***.705****	0.10	***.593****	***.826****	***.654****	***-.535****
Var_GDP	1.00	***-.528****	-0.03	***-.392****	-0.09	-0.23	***-.493****	***-.439****	0.14	***-.517****	-0.04
Health		1.00	***.453****	***.500****	***.623****	***.536****	0.27	***.926****	0.29	***.639****	-0.25
Instit			1.00	***.532****	***.696****	***.588****	-0.02	***.502****	***.785****	***.479****	***-.651****
Infra				1.00	***.563****	***.683****	0.19	***.586****	***.558****	***.751****	-0.27
Infected					1.00	***.882****	-0.03	***.690****	***.591****	***.451****	***-.443****
Deaths						1.00	0.12	***.602****	***.556****	***.534****	-0.30
Age							1.00	0.20	-0.16	***.388****	0.29
Birth								1.00	0.37	***.592****	-0.36
Nurses									1.00	***.510****	***-.404****
Healthexp										1.00	-0.02

Source: Own work (** Sign < 0.01; * Sign < 0.05)

Table 3. Significant differences in variables by country (own work).

Variable	Covid	Deaths				Infected			
		Median	Dev.	H Kruskal-Wallis	Sig.	Median	Dev.	H Kruskal-Wallis	Sig.
GCI	< Covid	69.526	1.260	11.226	**0.001**	69.833	1.462	7.626	**0.006**
	> Covid	78.222	1.211			76.800	1.263		
Var_GDP	< Covid	1.795	0.335	0.136	0.712	1.906	0.342	1.496	0.221
	> Covid	1.933	0.516			1.720	0.490		
Health	< Covid	67.779	0.510	8.721	**0.003**	67.644	0.520	10.331	**0.001**
	> Covid	70.633	0.356			70.590	0.320		
Instit	< Covid	62.895	1.917	6.171	**0.013**	62.917	2.059	5.520	**0.019**
	> Covid	71.467	2.057			70.570	1.933		
Infra	< Covid	79.495	1.176	9.009	**0.003**	79.428	1.291	8.143	**0.004**
	> Covid	86.511	1.708			85.930	1.498		
Age	< Covid	16.900	0.411	0.119	0.730	16.967	0.465	0.014	0.904
	> Covid	16.956	1.015			16.830	0.855		
Birth	< Covid	77.995	0.670	14.961	**0.000**	77.883	0.699	12.123	**0.000**
	> Covid	81.622	0.198			81.460	0.229		
Nurses	< Covid	6.868	0.625	6.299	**0.012**	7.011	0.689	4.354	**0.037**
	> Covid	9.633	0.874			9.100	0.829		
Healthexp	< Covid	8.205	0.438	4.583	**0.032**	8.117	0.456	5.301	**0.021**
	> Covid	9.833	0.523			9.830	0.457		
Pharmaexp	< Covid	1.695	0.122	2.27	0.132	1.678	0.128	0.881	0.348
	> Covid	1,333	0,122			1,400	0,125		

Table 4. Propensity to the impact of COVID-19 due to death and infections (own work).

Deaths					Infected				
Variable	*Coef.*	*Std. Err.*	*Sig.*	*Odds.*	*Variable*	*Coef.*	*Std. Err.*	*Sig.*	*Odds.*
Const	-166.145	53.65	0.002	0.000	Const	-89.325	31.6797	0.005	0.0000
Var_GDP	2.4807	0.9491	***0.009***	11.9497	Var_GDP	0.5999	0.3456	0.083	1.8219
Health	0.9727	0.3132	***0.002***	2.6452	Health	0.6179	0.2212	***0.005***	1.8550
Insti	0.0572	0.0733	0.435	1.0589	Insti	0.0420	0.1076	0.696	1.0429
Infra	1.1645	0.4194	***0.006***	3.2046	Infra	0.4262	0.1887	***0.024***	1.5315
Healthexp	-3.1244	1.0617	***0.003***	0.0439	Healthexp	-1.1750	0.5558	***0.035***	0.3087
Pharmaexp	-1.2362	3.1427	0.694	0.2904	Pharmaexp	2.2128	2.5447	0.385	9.1416
Wail chi2=13.52; Prob>chi2 = 0.0355; Pseudo R2 = 0.7414					Wail chi2=15.97; Prob>chi2 = 0.0139; Pseudo R2 = 0.5637				

Figure 1. Relationship between the GCI and the incidence of COVID-19 in the different European countries (own work).