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Effects of COVID-19 pandemic prevention and mitigation measures on confidence indices in OECD countries

Efectos de las medidas de prevención y mitigación de la pandemia de COVID-19 sobre los índices de confianza en países de la OCDE

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Abstract

Analyzing the impact of the COVID-19 pandemic on economic uncertainty is essential. Especially when one considers that measures of economic uncertainty can provide forward-looking information about economic activity in real time. For this purpose, the Consumer Confidence Index and the Business Confidence Index are used as dependent variables. On the other hand, to analyze the consequences of the pandemic, the number of deaths confirmed by COVID-19 is used as an independent variable. Similarly, the index of economic support and the index of government response were used to assess measures of containment and mitigation of the pandemic. Two samples of different composition were considered, one for each confidence index. Both samples are composed of 28 OECD member or partner countries. The Generalized Method of Moments with two-way fixed effects was used to perform the statistical analysis.

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The results show that there is a positive relationship between economic uncertainty and the number of deaths confirmed by COVID-19. On the other hand, a negative relationship was detected between the government response rate and economic uncertainty.

JEL Code: C23, E32, D8, E71
Keywords: COVID-19; economic uncertainty; containment measures; mortality

Resumen

Analizar el impacto de la pandemia de COVID-19 sobre la incertidumbre económica es esencial. Sobre todo, cuando se considera que las medidas de incertidumbre económica pueden proporcionar información prospectiva acerca de la actividad económica en tiempo real. Con este fin, se utilizan el índice de confianza del consumidor y el índice de confianza empresarial como variables dependientes. Por otro parte, para analizar las consecuencias de la pandemia se utiliza: el número de decesos confirmados por COVID-19 como variable independiente. De igual manera, para evaluar las medidas de contención y mitigación de la pandemia se emplearon el índice de apoyo económico y el índice de respuesta gubernamental. Se consideraron dos muestras de diferente composición, una para cada índice de confianza. Ambas muestras se componen de 28 países miembros o socios de la OCDE. Se utilizó el Método Generalizado de Momentos con efectos fijos de dos vías para realizar el análisis estadístico. Los resultados muestran que existe una relación positiva entre la incertidumbre económica y el número de decesos confirmados por COVID-19. Por otro lado, se detectó una relación negativa entre el índice de respuesta gubernamental y la incertidumbre económica

Código JEL: C23, E32, D8, E71
Palabras clave: COVID-19; incertidumbre económica; medidas de contención; mortalidad

Introduction

The impact of the COVID-19 pandemic has caused a shock to the world economy, spanning multiple periods and disrupting supply, demand, and productivity. It is almost perfectly synchronized within and among countries. The health, social, and economic consequences are catastrophic not only during the foreseeable few weeks after the crisis but potentially for a long time (Ludvigson, Ma, & Ng, 2020).

COVID-19 has led to a significant increase in uncertainty around the world. This uncertainty can be seen in several aspects, such as the ultimate size of the mortality shock, the duration and effectiveness of social distancing, the freezing of the market, the effectiveness of mitigation and containment measures, related public policy responses, and the extent to which pandemic-induced changes in consumer and business spending patterns will persist (Baker, Bloom, & Terry, 2020).

It is necessary to quantify uncertainty to provide a convenient input to a statistical model to analyze the effect that the COVID 19 pandemic has had on uncertainty. Obtaining adequate data is a critical challenge in practice because to estimate the present and future effect of COVID 19 on uncertainty,

measures that are available in real time or near real time are necessary. There is a need for timely information that can be obtained through forward-looking measures of economic uncertainty (Baker, Bloom, & Terry, 2020). Therefore, the consumer confidence index is used, which provides information about the future evolution of consumption and savings in households based on consumers' answers about their expected financial situation and their feelings about the general economic situation, unemployment, and savings capacity. Similarly, the business confidence index provides information on the future evolution of business based on opinion surveys on events related to production, orders, and stocks of finished products in the industrial sector. This indicator can help monitor production growth and anticipate turning points in economic activity (OECD, 2020).

Despite the popularity of trust indices in the media and public policymakers, such indices have received little attention from the scientific community. Existing studies that use these indices tend to fall into two categories, according to Guo and He (2020). The first category considers trust as an exogenous shock, i.e., trust is perceived to be driven by the "animal spirits" mentioned by Keynes (2018) and to have little relation to the fundamentals of the economy, according to Ackerlof and Shiller (2008). Consequently, trust is considered to have a unidirectional impact on economic growth that amplifies economic fluctuations, according to Lorenzoni (2009), Angeletos and La'O (2013), and Huo and Takayama (2015). The second category considers trust as an endogenous variable, i.e., trust is perceived to be related to the fundamentals of the economy, according to Acemoglu and Scott (1994) and Barsky and Sims (2012) (Guo & He, 2020).

There is a growing literature on the effects of the COVID-19 pandemic on the economy. Some works combine epidemiological structures with economic models, as in Eichenbaum, Rebelo, and Trabandt (2020) and Atkeson (2020). Other papers focus on measuring the effects of the COVID-19 pandemic on asset markets and at the level of individual firms, as in the work of Alfaro et al. (2020), Baker et al. (2020b), and Hassan et al. (2020). Moreover, Correia, Luck, and Verner (2020) study the historical variation in other pandemics. Finally, there is a new area in the literature relating uncertainty to the current pandemic, as in the work of Baker et al. (2020a); Leduc and Zheng (2020); Ludvigson, Ma, and Ng (2020) (Baker, Bloom, & Terry, 2020).

On the other hand, this study considers two groups of independent variables. The first group measures the consequences of the COVID-19 pandemic through the number of deaths, while the second group analyzes the containment and mitigation measures that governments have adopted. This group comprises two variables, the government response index and the economic support index. The first focuses on school and workplace closures and public information campaigns, among other measures. At the same time, the economic support index concentrates on measures to protect the population's income.

Consequently, this paper focuses on the study of three relationships. The first is the relationship between uncertainty and the effects caused by the COVID-19 pandemic, the second is between uncertainty

and the measures to mitigate the economic effects caused by the COVID-19 pandemic, and the third is between uncertainty and the measures adopted by governments to mitigate and contain the COVID-19 pandemic.

Three propositions are analyzed. The first is a positive relationship between uncertainty and the number of COVID-19 deaths. The second points to a negative relationship between uncertainty and the economic support index, and the third considers a negative relationship between uncertainty and the government's response to the pandemic.

The study considered two samples to assess the above empirically. The first uses the consumer confidence index as the dependent variable and the number of deaths, the economic support index, and the government response index as independent variables. The second sample uses the business confidence index as the dependent variable to analyze uncertainty and the same variables as the first sample as independent variables. Both samples include 28 countries and the tables with the countries that comprise each sample can be found in the appendix identified as 1a and 1b. The estimation technique is the Generalized Method of Moments with two-way fixed effects for both samples.

The rest of the paper is divided into the following sections. The data section contains a description of the variables and their basic statistics. The methodology section describes the estimation methods and the models to be estimated. The results section presents the results and analysis of the estimated model. Finally, the conclusions contain the main contributions of the study.

Literature review

Confidence indices are indicators of a macroeconomic nature that measure the behavior of individuals in an economic system in terms of the consumption and investment expectations of individuals and companies to forecast the short-term conditions in which the economy will develop in a country, as pointed out by Carroll, Fuhrer, and Wilcox (1994), Ludvigson (2004), and Juhro and Iyke (2020). Carroll, Fuhrer, and Wilcox (1994) analyze whether confidence indices can forecast macroeconomic aggregates by themselves, finding that lagged confidence indices explain changes in household consumption. Ludvigson's (2004) work assesses the relationship between consumer attitudes and the real economy. Their results suggest that confidence indices contain information about future aggregate consumer spending growth. On the other hand, Juhro and Iyke (2020) analyze the determinants of consumer spending by individuals in Indonesia, using data on two measures of confidence: the consumer confidence index and the index of producer firms. Furthermore, they employ three standard predictors of consumption: labor income, interest rate, and a measure of consumer confidence. They indicate that the

forecast of consumer and business expectations can be improved when consumer confidence measures are incorporated.

The work of Barsky and Sims (2012), Beaudry and Portier (2014), and Feve and Guay (2018) emphasizes the mechanism by which confidence indices drive business cycles. The idea of this strand of the literature is that innovations in consumer confidence can reflect people's sentiment about the economic outlook and capture changes in agents' information due to the arrival of news about future productivity, which is not reflected in current data.

The emergence of the COVID-19 pandemic has led to new branches of literature that relate economics to the effects of the pandemic. One such branch relates economic uncertainty to the current pandemic. Some of the major papers studying this relationship are Baker et al. (2020a), Leduc and Zheng (2020), Ludvigson, Ma, and Ng (2020), Baker Bloom and Terry (2020), and Dietrich et al. (2020).

Baker et al. (2020a) use three indicators to analyze economic uncertainty. The first is stock market volatility, the second studies economic uncertainty based on news, and the third is composed of subjective economic uncertainty based on surveys. Data from these indicators are used in the model developed by Baker, Bloom, and Terry (2020), which analyzes the effects of a disaster on economic activity to estimate the effect of the COVID-19 pandemic on economic growth in the United States. Their results indicate that the contraction in real GDP could be about 11% in the fourth quarter of 2020.

Leduc and Zheng (2020) study whether an increase in job uncertainty could increase automation. Using a New-Keynesian DSGE (dynamic stochastic general equilibrium) model, these authors find that an increase in job uncertainty stimulates automation. Ludvigson, Ma, and Ng (2020) attempt to quantify the impact of disasters on the macroeconomy and incorporate these results into the analysis of the impact of COVID-19 by constructing a series with monthly data that considers the disasters that have occurred from 1980 to 2019. Specifically, they analyze the impact of a costly disaster on economic activity and uncertainty using the VAR method. Their findings indicate that in the case of a three-month duration of the pandemic caused by COVID-19, a 12 percent cumulative drop in industrial activity and at least five months of macroeconomic uncertainty would be observed.

Baker, Bloom, and Terry (2020) ask whether there is a causal relationship between the business cycle and uncertainty. To study this relationship, they construct multi-country panel data of stock market levels and volatility. They also use data regarding natural disasters, terrorist attacks, and political shocks in regressions and VAR estimations. They estimate that COVID-19 will reduce US GDP by 9% this year. Finally, Dietrich et al. (2020) surveyed households on their expectations regarding the economic consequences of the pandemic caused by COVID-19. This survey has a daily frequency and is in real time. The data obtained from the surveys are entered into a New Keynesian business cycle model. The model results indicate that the economic impact of the pandemic in the short run depends primarily on monetary policy.

Another study related to the effect of uncertainty caused by COVID-19 on consumer demand is that of Norouzi et al. (2020). The authors develop a comparative neural network model to analyze the impacts of COVID-19 on electricity and oil demand in China. The analysis indicates that the severity of the epidemic significantly affects electricity and oil demand, both directly and indirectly. The above results indicate that the pandemic status has a significant impact on energy demand and the consumption decisions of the population.

Finally, the COVID-19 pandemic is affecting the health of individuals and is also a social crisis that is affecting all aspects of daily life. In response to the pandemic outbreak, leaders in many countries decided to save lives before saving the economy by declaring sudden or staggered shutdowns in their countries. As part of the strategy to save human lives, they implemented policies such as "social distancing" and "staying at home," strategies that radically changed people's expectations about their consumption decisions. These strategies severely damaged various branches of commerce and productive industry, as Donthu and Gustafsson (2020) note.

Data

The database for this study divides the group of countries under study into two groups: sample A and sample B. These samples comprise two balanced panels composed of information from 28 OECD member or partner countries[1]. The study period runs from January 2020 to May 2020 for both samples. The choice of the countries included in the study was mainly because of data availability. The information for the dependent variables (consumer confidence index and business confidence index) comes from the OECD database (2020). On the other hand, the information for the independent variables comes from the Oxford COVID-19 Government Response Tracker database.

Sample A uses the consumer confidence index (cci) as the dependent variable. A value above 100 translates into increased consumer confidence in the future economic situation. They are less likely to save and more likely to spend money on major purchases in the next 12 months. Values below 100 indicate a pessimistic attitude toward future economic developments, resulting in a tendency to save more and consume less. Likewise, in the business confidence index (cbi)—used as the dependent variable in sample B in this case—obtaining values above 100 means an increase in confidence in the performance of companies in the near future, while values below 100 indicate pessimism regarding future performance. For samples A and B, the independent variables are the confirmed number of deaths caused by COVID-19 (confdec), the economic support index (esi), and the government response index (gri). The economic

[1]The countries are different in both samples, and the tables with the names of the countries per sample are in the appendix.

support index is composed of the average of the income support indicator and the household debt relief indicator; higher values for these variables mean higher disposable income, whereas lower values mean lower income. The government response index is constituted by the average of thirteen aspects that governments have adopted to prevent the spread of COVID-19—the following stand out: school closures, closure of workplaces, and public information campaigns[2]. High values for this index point to greater activity on the part of the different governments to contain COVID-19; low values would be related to less governmental activity to contain COVID-19. Tables 1 and 2 present the variables used in this study and their basic statistics.

Table 1
Variables

Variable	Abbreviation	Source	Unit of Measure
Consumer confidence index	cci	OECD database	Number
Business confidence index	cbi	OECD database	Number
Confirmed deaths from COVID-19	confdec	Oxford COVID-19 government response tracker	Number
Economic support index	esi	Oxford COVID-19 government response tracker	Number
Government response index	gri	Oxford COVID-19 government response tracker	Number

Source: created by the author

Table 2
Descriptive statistics sample A

Variable	Mean	Standard deviation	Maximum	Minimum
Consumer confidence index	99.1	1.8	103.36	94.56
Confirmed deaths from COVID-19	3141.3	11259.9	100442	0
Economic support index	40.3	37.1	100	0
Government response index	44.1	30.1	84.62	0

Source: created by the author

[2]More information on the composition of the economic support index and the government response index can be found in the work of Hale *et al.* (2020) and at: www.bsg.ox.ac.uk/covidtracker

Table 3
Descriptive statistics sample B

Variable	Mean	Standard deviation	Maximum	Minimum
Business confidence index	97.8	2.6	102.8	85.7
Confirmed deaths from COVID-19	3226.2	11254	100442	0
Economic support index	38.4	37.1	100	0
Government response index	45.2	30.6	84.62	0

Source: created by the author

Methodology

To analyze the three assumptions under study: 1) the uncertainty and the effects caused by the COVID-19 pandemic, 2) the uncertainty and the measures to mitigate the economic effects caused by the COVID-19 pandemic, and 3) the link between uncertainty and the measures taken by governments to contain the pandemic, two samples, A, and B, are considered. The first step is to establish the regression model for panel data for each sample. Sample A uses the consumer confidence index (cci) as the dependent variable, while sample B uses the business confidence index (cbi). Both samples contain the same independent variables, which are: deaths confirmed by COVID-19 (confdec), economic support index (esi), and government response index (gri). Consequently, two models are specified, one for each sample. Equation (1) presents the model for sample A:

$$\mathrm{cci}_{i,t} = c + \mathrm{confdec}_{i,t} + \mathrm{esi}_{i,t} + \mathrm{gri}_{i,t} + \epsilon_{i,t} \quad (1)$$

Where i represents the country and t represents time. Both samples span from January 2020 to May 2020. Likewise, samples A and B are composed of 28 countries; however, the countries in each sample differ from each other. Equation (2) specifies the model for sample B.

$$\mathrm{cbi}_{i,t} = c + \mathrm{confdec}_{i,t} + \mathrm{esi}_{i,t} + \mathrm{gri}_{i,t} + \epsilon_{i,t} \quad (2)$$

Some countries exhibit specific characteristics in both samples, which cannot be observed directly. Likewise, certain factors occur over time, such as strikes and natural disasters, which cannot be observed directly either. Therefore, as a second step, the study considers a two-way fixed effects model, which proposes the inclusion of two dummy variables, one for the specific characteristics of each country, such as cultural aspects and educational level, among others. The model is expressed as follows:

$$y_{i,t} = \theta_i + \tau_t + \beta x_{i,t} + \varepsilon_{it} \quad (3)$$

Where θ_i and τ_t are the country-specific characteristics and time effects, respectively, and $x_{i,t}$ are the independent variables. Therefore, the models for each of the samples are expressed as follows:

$$cbi_{i,t} = c + confdec_{i,t} + esi_{i,t} + gri_{i,t} + v_i + \lambda_t + \varepsilon_{it} \quad (4)$$

$$cci_{i,t} = c + confdec_{i,t} + esi_{i,t} + gri_{i,t} + v_i + \lambda_t + \varepsilon_{it} \quad (5)$$

Where $\varepsilon_{i,t}$ is the error term. The Hausman Correlated Random Effects test is the specification test used to determine whether to consider fixed or random effects.

Finally, the Generalized Method of Moments (GMM) proposed by Arellano and Bond (1991) is used in conjunction with the two-way fixed effects estimator. The GMM method helps control endogeneity problems, measurement errors, heteroscedasticity, and simultaneous reverse causality (Ganda, 2019). Moreover, this technique is appropriate when the number of cross-sectional units (N) is larger than the time (T). This study considers that $N = 28$ and $T = 5$. For the above reasons, it is considered that the use of the GMM method is appropriate in this case. The models for samples A and B are described in the following equations:

$$cbi_{i,t} = \beta cbi_{i,t-1} + \delta z_{i,t} + \varepsilon_{it} \quad (6)$$

$$cci_{i,t} = \beta cci_{i,t-1} + \delta z_{i,t} + \varepsilon_{it} \quad (7)$$

Where $z_{i,t}$ represents the independent variables (confirmed deaths from COVID-19, Economic Support Index, and Government Response Index); $cbi_{i,t}$ and $cci_{i,t}$ are variables that measure uncertainty and $\beta cbi_{i,t-1}$ and $\beta cci_{i,t-1}$ represent their lagged values. Arellano and Bond (1991) recommend using lagged explanatory variables as instrumental variables. Similarly, the consistency of this estimator depends on the validity of the instruments. The study uses the Hansen Sargan specification test of over-identifying restrictions to address this situation. It examines the general validity of the instruments by analyzing the analog sample of moment conditions used in the estimation process. Finally, this estimator is used with a modification that consists of not considering the lagged term of the dependent variables cbi and cci, making the estimator non-dynamic. The models used for the estimations are the following:

$$\ln(cbi_{i,t}) = c + \ln(confdec_{i,t}) + \ln(esi_{i,t}) + \ln(gri_{i,t}) + v_i + \lambda_t + \varepsilon_{it} \quad (8)$$

$$\ln(cci_{i,t}) = c + \ln(confdec_{i,t}) + \ln(esi_{i,t}) + \ln(gri_{i,t}) + v_i + \lambda_t + \varepsilon_{it} \quad (9)$$

Results

The study performed two estimations to analyze the three possible links between uncertainty and the COVID-19 pandemic, one for each sample considered. Both estimations used the Generalized Method of Moments with two-way fixed effects.

Table 4
Results for samples A and B.

Technique: Generalized Method of Moments with two-way fixed effects		
	Dependent variables	
Remarks: 140	Sample A	Sample B
	cci	cbi
c	4.3^{***}	4.4^{***}
Independent variables		
log(confdec)	-0.01^{**}	-0.02^{***}
log(esi)	0.002	−0.002
log (gri)	0.07^{*}	0.07
Statistics		
R squared	0.72	0.76
Durbin Watson statistic	2.13	2.03
J − Statistic	4.7	6.7
Probability of the J − Statistic	0.31	0.24
Hausman test for correlated random effects (cross − section)	0.00	0.00

Note: *** indicates a statistical significance level of 1%, ** means a statistical significance level of 5%, and * denotes a statistical significance level of 10%
Source: created by the author

Table 4 presents the results for sample A. The variables esi and gri are not statistically significant, whereas the variable confdec is statistically significant at 1%. A one-unit increase in this variable means a 0.002% increase in uncertainty. The Hausman Random Effects test results reject the null hypothesis of no misspecification; therefore, the use of fixed effects would be appropriate. In addition, the results of the Hansen Sargan test validate the instrumental variables used. These results indicate a positive relationship between the number of deaths confirmed by COVID-19 and the uncertainty measured by the consumer confidence index.

The results for sample B presented in Table 4 indicate that the variable esi is not statistically significant. The confdec and gri variables are statistically significant, the former at 5% and the latter at 10%. A one-unit increase in the confdec variable points to an increase in uncertainty of 0.01%. On the other hand, a one-unit increase in the gri variable represents a 0.07% decrease in uncertainty. As in sample A, the results of the Hansen Sargan test validate the instrumental variables used. Likewise, the Hausman Random Effects test results justify the use of fixed effects.

Conclusions

This study analyzed the relationship between economic uncertainty and the COVID-19 pandemic, examining three premises. The first is a positive relationship between uncertainty and the number of COVID-19 deaths. The second points to a negative relationship between uncertainty and the economic support index, and the third considers a negative relationship between uncertainty and the government's response to the pandemic. It considered two samples to analyze these assumptions, samples A and B, which include 28 OECD members and partner countries. The period under study is from January 2020 to May 2020. The estimation technique used in samples A and B is the Generalized Method of Moments with two-way fixed effects. In sample A, the evidence supports the hypothesis of a positive relationship between uncertainty and the number of deaths confirmed by COVID-19. No evidence was found for the other two hypotheses, either for or against.

Meanwhile, in sample B there is also evidence supporting the hypothesis of a positive relationship between uncertainty and the number of deaths confirmed by COVID-19. There is also evidence to support a negative relationship between uncertainty as measured by the business confidence index and the government response index. However, no significant evidence is found in favor of the second hypothesis. Based on the Hausman correlated random effects tests results for both samples, it was decided to use the two-way fixed effects estimator.

Similarly, the Hansen Sargan test results suggest that the instruments used are valid. Therefore, the results suggest prioritizing the resolution of the health problem caused by COVID-19 through aggressive prevention and mitigation measures that permit a rapid reduction in the number of deaths to regain the confidence of the business sector and consumers in the shortest time possible.

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Annex

Table A1
Countries in sample A

Germany	Estonia	Poland
Australia	Finland	Portugal
Austria	France	United Kingdom
Belgium	Greece	Czech Republic
Brazil	Hungary	Russia
South Korea	Ireland	Sweden
Denmark	Japan	Switzerland
Slovenia	Lithuania	Turkey
Spain	Luxembourg	
United States	The Netherlands	

Source: created by the author

Table A2
Countries in sample B

Germany	Spain	The Netherlands
Austria	United States	Poland
Belgium	Estonia	Portugal
Brazil	Finland	United Kingdom
Chile	France	Czech Republic
China	Greece	Russia
South Korea	Hungary	Sweden
Denmark	Ireland	Turkey
Slovakia	Lithuania	
Slovenia	Luxembourg	

Source: created by the author