Impact of the severity of the "Anti-Covid" measures on the performance of companies in France

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Introduction

Appeared on November 17, 2019 in Wuhan, Hubei province (in central China), before spreading around the world, the epidemic of covid-19 is declared a pandemic on March 11, 2020 by the World Health Organization (WHO). Faced with this health crisis, the French President has announced strong measures (precautionary and preventive one) to reduce the spread of the pandemic. Among the measures announced, we retain the measures of confinement, limitation of mobility, closure of certain public and private places (parks, museums, libraries, cinemas, swimming pools, schools, universities, gyms, cultural or religious centers, restaurants, etc.) and cancellation of certain events involving a mass gathering.

These various necessary measures of prevention and precaution have had negative repercussions on economic activity, plunging the country into a period of recession, the strongest one since 1945. Indeed, last June, according to the International Monetary Fund (IMF), the French economy should experience one of the worst recessions in the world this year, with a 12.5% drop in Gross Domestic Product (GDP).

This period of recession has more or less put in difficulty the production companies depending on their sectors of intervention (digital, insurance, energy, catering, hotels, cultural, events, etc.). But in order to support companies in difficulty and vulnerable people, the government has put in place a set of help (social nets) to compensate the collateral damage caused by the measures taken, which have become stricter and more restrictive with the resurgence of the number of positive cases.

The crisis therefore led to drastic measures being taken, which in turn affected the lives and survival of businesses. As the pandemic grew, the measures taken became more and more strict and restrictive. One may wonder, therefore, what impact the severity of these measures had on the performance of companies.

I- Theoretical framework

1.1 Objective of the study

Determine the effect of the severity of anti-covid measures on firm performance.

1.2 Research Methodology

The purpose of this section is to outline the methods and procedures by which we achieved our specific objectives. First, we outline the data collection techniques and analysis methods used.

1.3 Data collection techniques

The data of our study were collected online on the official sites in charge of their diffusion. They cover the period from January 1st 2020 to April 27th 2021.

1.4 Presentation of the variables

This study is based on the following variables:

(i) ***Oxford Covid-19 Government Response Stringency index (OxCGRT)***: this index records the strictness of "lockdown style" policies that primarily restrict people's behavior. It is a number between 1 and 100 that reflect the strictness of the government response to the pandemic. A higher position in an index does not necessarily mean that a country's response is 'better' than others lower on the index. This data is provided by University of Oxford.

(ii) ***Economic support index***: this index reports a number between 1 and 100, which records measures such as income support and debt relief, taken by the government.

(iii) ***Weekly monitoring of business failures***: The number of bankruptcies is based on the census of collective procedures giving place to the submission of a declaration of cessation of payment. It is therefore the number of redressments and liquidations, as of the date of the judgment. This definition excludes other procedures, in particular the opening of safeguard and conciliation procedures. This data is provided by Banque de France.

(iv) ***Cancelling public events***: it's a categorical variable which take a value 0 if no measures has been taken regarding public event; 1 if it has been recommended to cancel public events and 2 if it was required to cancel public event.

1.5 Data processing (database cleaning)

Our data processing consisted of aggregating the daily observed data into a week, especially those related to the stringency index, and harmonizing the dates of the collected data. For statistical and economic interpretation purposes, we considered modality 2 of the "cancelling public events" variable as a binary variable that has a value of 0 for any value other than 2.

1.6 Descriptive analysis

The usefulness of this analysis is its contribution to the appreciation of the evolution of the variables in our study. It consists on the one hand, in presenting

some descriptive statistics of all the variables in our database and on the other hand, in representing graphically their evolution, for an appreciation of the trends.

1.7 Econometric analysis

The objective of this analysis is to measure the effect of restrictive anti-covid measures on the performance of firms. In this subsection we specify the variables of our model, the type of model and the expected signs of the estimates.

1.8 Presentation of the model

Before specifying our model to be estimated, we present the variables retained in our model. They are presented as follows:

Dependent variable: To measure the performance of firms during the study period under consideration, we have retained the variable that provides information on the number of firms in redressment (a procedure that provides, for a legal unit that is no longer able to pay its debts, the means of discharging its liabilities, which is rarely full discharge), in judicial liquidation (a procedure that puts an end to the activity of the legal unit or organizes a global or partial transfer) or in safeguard procedure (a procedure instituted by the law on the safeguard of enterprises, allowing a legal unit to anticipate its difficulties and to reorganize itself in order to avoid the cessation of payments). This is the variable ***number of bankruptcies.***

Explanatory variables: These are the following variables:

- ***Stringency index :*** To measure the severity of the measures taken by the French government, we considered the severity index composed by Thomas

Hale et al. This composite measure is a simple additive score of nine indicators measured on an ordinal scale, rescaled to vary from 0 to 100. We should note that this measure is for comparative purposes only and should not necessarily be interpreted as a rating of the appropriateness or effectiveness of a country's response.

- ***Economic support index:*** which records measures such as income support and debt relief, taken by the government.
- ***Cancelling public events:*** it is a dummy variable which take the value 1 if cancelling public events has been required and 0 if not.

Model selected

Thus, the model chosen for the estimation of our model is as follows:

$$\textit{Nber\_bankruptcies}_t = \alpha + \beta_1 * \textit{Stringency\_index}_t + \beta_2 * \textit{Eco\_supp\_index}_t + \beta_3 * \textit{Pub\_event\_cancel}_t + \varepsilon_t$$

This model is estimated under the following assumptions:

- The matrix X grouping the explanatory variables is of full rank, i.e. no multicollinearity : rg(X)=3 ;
- The explanatory variables grouped in X are exogenous: E(εX)=0 ;
- Homoscedasticity of error terms: Var(εtxt)=σ2 t=1,…,T ;
- No autocorrelation of errors : Cov(εt,εsx)=0, pour tout t≠s
- Normality.

II- Presentation of the results

2.1 Descriptive analysis

Before going to the econometric analysis, we try to describe our variables through descriptive statistics using R command (summary, cor and plot).

From the results obtain, we notice that, for the ***Stringency index*** the maximum value (87,96) is the 13th observation corresponding to the week of 29th March 2020, which refers to a period where the pandemic was at a critical point. The average stringency index, given the period of study, is about 56. Same trend has been observed for ***economic support index,*** the maximum is 100 and has been attend during the week of 12th March 2020 practically the same week has the stringency index maximum. This prove the fact that, strong measures of restrictions have been followed by proportional economic support toward firm and citizens.

For the variable relating to the number of firms in bankrupt, we note that the maximum (1223) was reached in the week of March 08th, 2020. The average number of firms in bankrupt over the period considered is 584. The minimum (36) was reached in the week of 03 January 2021, which is evidence of an improvement in the performance of firms (see Table 1).

Table 1: Descriptive statistics

Variables	Minimum	Mean	Maximum
Stringency Index	0	56.38	87.96
Economic Support Index	0	56.66	100.00
Number of bankrupt firms	36	583.4	1223.0

Source: Realized by the authors, 2021

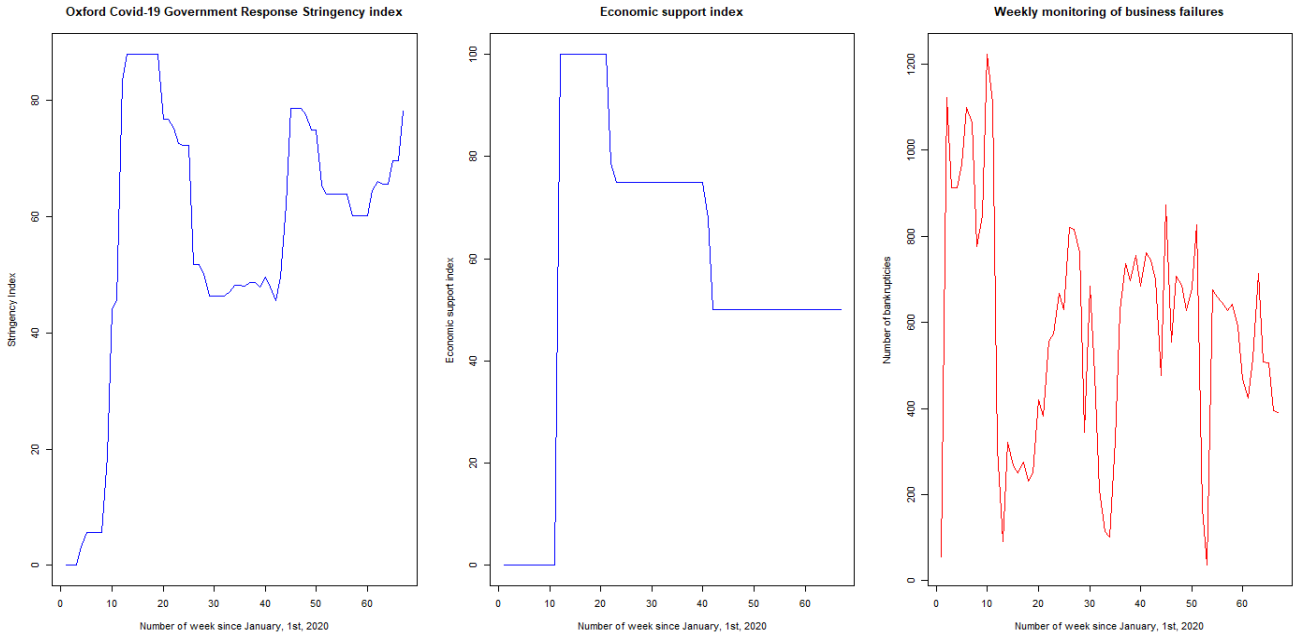
The correlation between the number of bankrupt firms and these indicators (severity of measures and economic aid) shows a relatively strong negative linear relationship between them (i.e. -0.5 and -0.61 respectively).

Regarding to the variable cancelling events, after having dichotomized the modality 2, in order to obtain a binary variable informing on the requirement of cancelling public events or not, we retain that over the period considered, the requirement of cancelling public events was observed over 47 weeks.

For an appreciation of the evolution of our variables of interest we proceeded to their graphic representations. The plot command in R allowed us to obtain the graphs below.

Regarding the obtained graphs, we notice that on the period of the first lockdown, the variables have all reached their maximums before engaging a progressive moderate fall, except the variable stringency index, which knew a second rise due to the application of the second wave of lockdown.

Figure 1: Graphical representations of the variables of interest



Source: Realized by the authors, under R, 2021

2.2 Econometric analysis

To determine the effect of the severity of the measures taken by the French government, we resort to econometric modeling as defined above. After regression, we obtain the following result:

Table 2: Regression results of the model

Ordinary Least Squared method				
Variables	***Estimate***	***Standard Error***	***t Value***	***Pr > |t|***
Intercept	925,709	67,406	13,733	<2e-16 ***
Stringency_index	-4,83	2,656	-1,818	0,0738 .
Eco_supp_index	-3,491	1,557	-2,242	0,0285 *
Pub_event_cancel	182,208	97,14	1,876	0,0653 .
R squared	0,4135			

Source:Realized by the authors, 2021

We note that all the estimated coefficients are statistically significant at the 10% threshold (P-value < 0.1). Moreover, the P-value of the F-statistic being lower than 5%, we conclude that the model is globally significant with a R squared around 50%.

We therefore conclude that an increase of :

- One point of the severity indicator would result in 4.83 points decrease in the number of companies in bankrupt;
- One point of the economic support indicator would result in 3.49 pointsdecrease in the number of firms in bankrupt.

We also note that the application of the cancellation order of public events would increase the number of bankruptcies by 182.

One might be surprised by the negative relationship between the dependent variable and the indicator of severity measures, but this negative relationship should be considered with the various financial support and tax relief, provided by the to government companies so that they can cope with the difficulties they are facing.

Indeed, a reinforcement of the measures of support to the companies was observed to allow the companies to face different difficulties. We can quote among others the measures of :

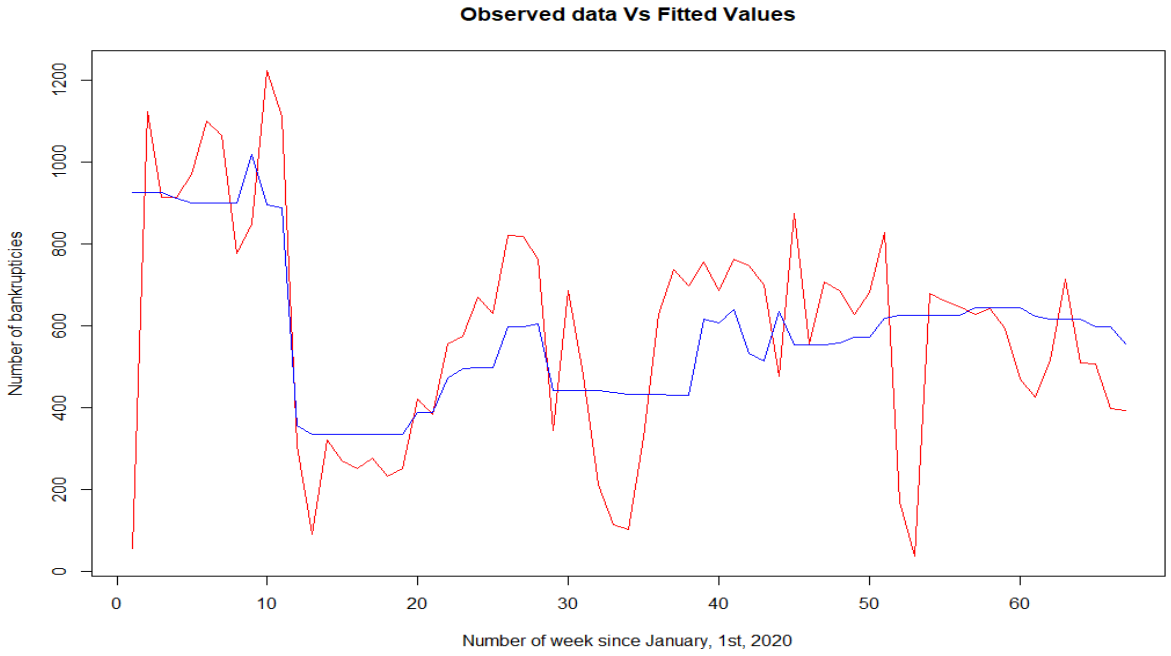
- ✓ strengthening the solidarity fund;
- ✓ Use of partial activity;
- ✓ strengthening and broadening of exemptions from social security contributions ;
- ✓ deferral of social security contributions;
- ✓ strengthening of state-guaranteed loans and direct state loans to companies ;
- ✓ Emergency measures for sectors with prolonged under-activity.

As these measures are considered in the indicator of the economic support, we can also better understand the sign obtained for this variable.

Having made some assumptions about the regression model, we proceeded to a verification of some of them, notably the normality of the residuals and their non-autocorrelation.

But before verifying those assumption, let us see how the model fits the data.

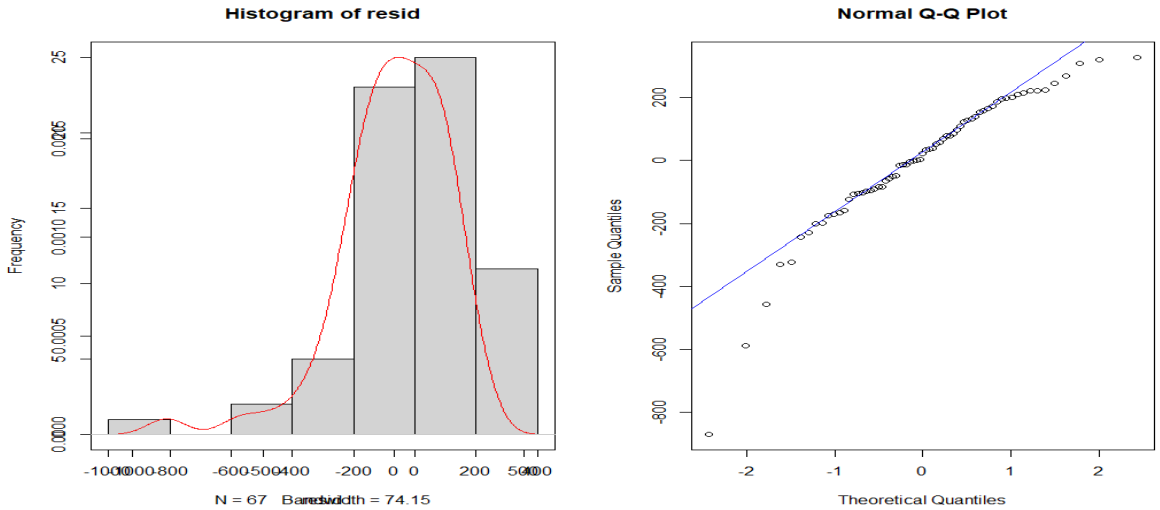
Graph 2: Data Vs Fitted value



Source: Realized by the authors, 2021 **Legend :** fitted value

Now, to test the normality of the residuals obtained, we used the normal Quantile-Quantile plot test. We obtain the graph below :

Graph 3: Normal Q-Q Plot

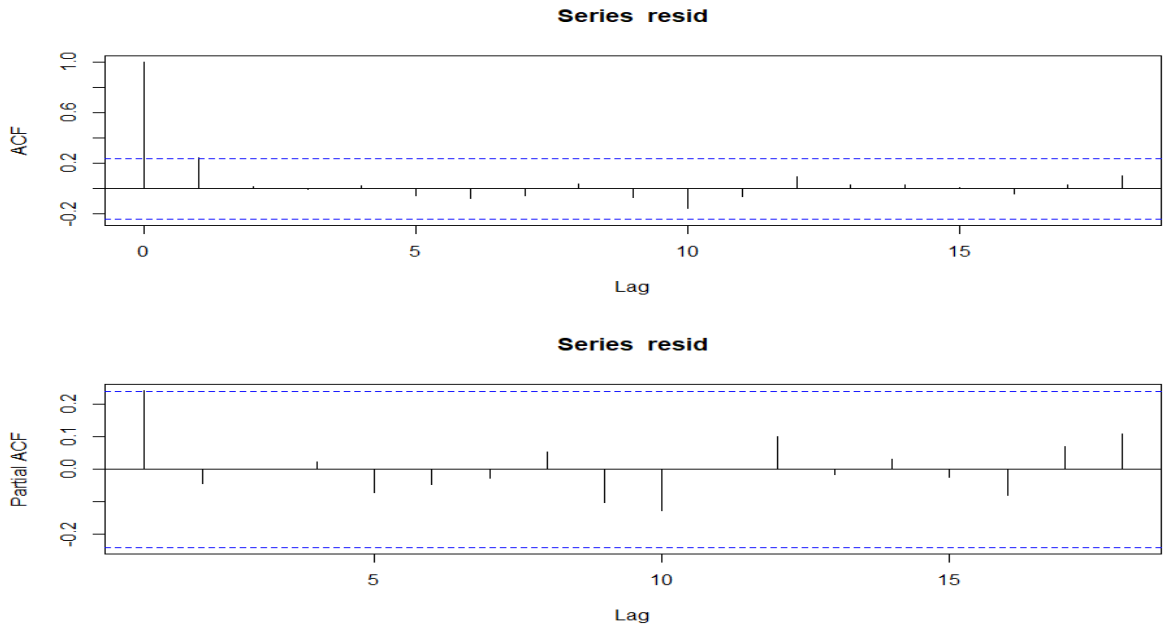


Source: Realized by the authors, 2021

We deduce from the graphical analysis that the residual is not normally distributed.

We obtain the following graph for the residual autocorrelation test.

Graph 4 : Autocorrelation Fonction & Partial Autocorrelation Fonction

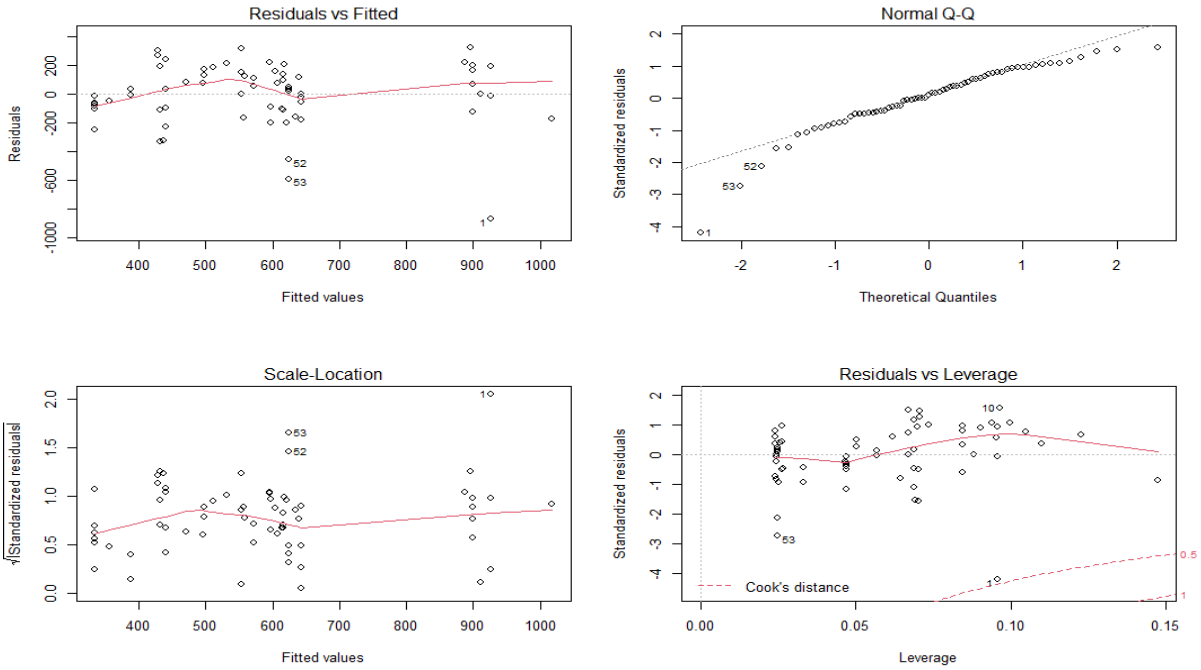


Source: Realized by the authors, 2021

From the obtained graph, we suspect a possible autocorrelation of the residuals.

The synthetic graphs of the tests on the residual are as follows:

Graph 5 : Multi plots regarding the residual



Source: Realized by the authors, 2021

We retain that the residuals are not normally distributed.

Conclusion

In summary, we find that the measures taken against the covid-19 pandemic have had negative effects on economic activity and therefore on the profitability of certain companies with a high human contact. The objective of the present study was to determine the effect of the "severity" of the restrictive measures taken, on the number of firms bankrupt observed. The linear relationship obtained was statistically significant and negative, and we conclude that the help provided by the government to firms was efficient or at least reduced the effect of the restrictive and preventive measures. However, our study remains limited by the lack of studies of violated hypotheses. Further study in the treatment of the violated hypotheses would allow a more accurate measurement of the quantified effect.

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