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**ECONOMIC MEASURES TO
COUNTERACT THE IMPACT
OF COVID-19 IN SPAIN**

Author: Ramon Alexis Buj Acosta

Tutor: Alberto Russo

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ABSTRACT

Approximately two years ago, the coronavirus pandemic brought the world economy to its knees as it left the world economy in a situation never seen before. The impact of the pandemic has been disastrous and although it was foreseen as a temporary effect, it has had the potential to cause long-term damage. In reference to our country, given certain characteristics in relation to companies, i.e., we are characterized by small and medium-sized enterprises (PYMES), family businesses, high seasonality among them, Spanish companies have been more vulnerable than in other neighboring countries.

Because of this situation, immediate policies were demanded not only in Spain, but also with financial assistance from Europe. The economic policies that were activated in Spain were limited in time, such as the ERTES, aid to the self-employed who could not carry out their activity and continued to pay monthly instalments, the creation of the minimum living income for the most disadvantaged families, these aids were limited in time until economic activity and employment recovered. The main objective of this aid was mainly to try to minimize the loss of income of households and companies affected by this unprecedented crisis and also to minimize the impact on the loss of the Spanish business fabric.

It should also be noted that the pandemic has had a very unequal impact on the different sectors, causing in many of them an irrecoverable loss of jobs associated with relatively low incomes. The economic activities that have been hardest hit since the outbreak of the coronavirus pandemic have been those that have provided most employment before the pandemic, such as the hotel and catering industry, which is so important in our country due to the great influence of tourism, and small businesses have also been greatly affected.

In relation to the policies employed, which we will discuss in more depth later, we highlight the most appropriate policy for these times, fiscal policy, while monetary policy must also be used to ensure financing and liquidity for economic agents. This entails a coordinated response among the many European countries in which a joint response is required through a mechanism for distributing financial resources, taking into account the country's characteristics and needs.

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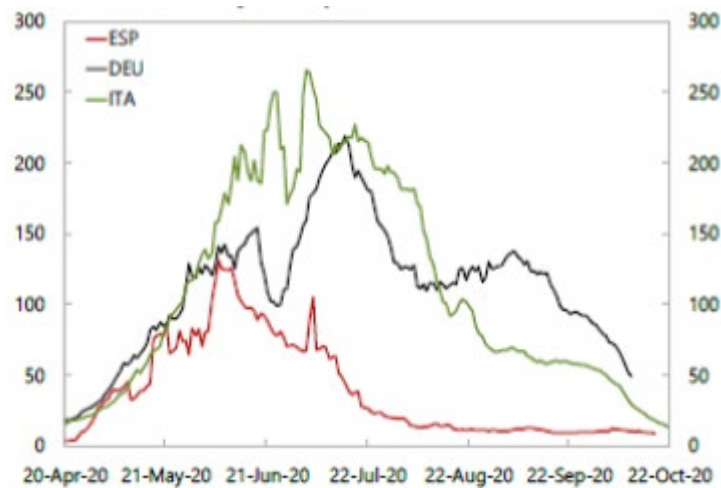
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1. Introduction

It all started in March 2020, the health authorities observing the situation limit of countries of our environment as for example Italy and United Kingdom with the objective to contain the spread of the disease order the strict confinement of the population in their homes and the closure of sectors called "non-essential" these include labor-intensive service industries, retail trade, hospitality that did not deliver at home. The explosive increase in cases in our country caused the government to declare a state of alarm on March 14 proposing a period of two weeks initially, but observing the situation lengthened. Restrictions on population mobility were drastically tightened during 30 March and 9 April with the suspension of all non-essential economic activity. (Chart 1)

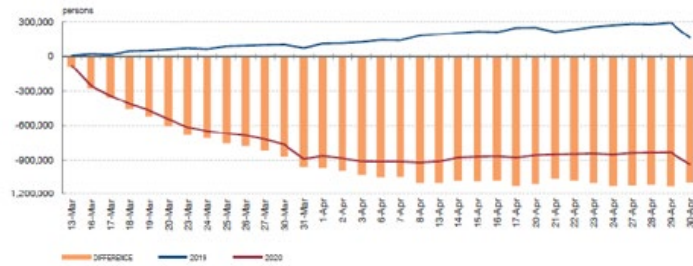
Chart 1 Daily positive tests from Spain, Germany and Italy



Source: Fondo monetario internacional

The fall in production activity had a more than obvious negative impact on the labor market. It is clear that the labor market is the place where all the problems created by the pandemic have had a very clear repercussion, whether due to the initial confinement or the application of restrictive measures later on to limit its expansion. Showing a clear increase in unemployment and therefore a reduction in social security enrolment. (Chart 2)

Chart 2 Developments in social security registrations between 13 March and 30 April



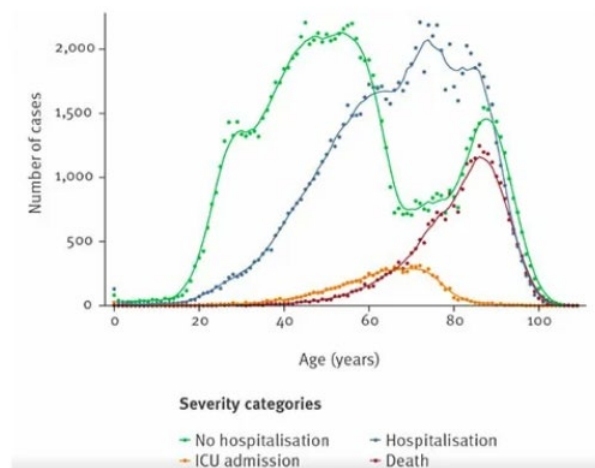
Source: Banco de España

From that day until the end of that month (March 2020), the affiliation fell by approximately 900,000 people, a plunge that was unprecedented and which interrupted the path of growth, after 6 years of improvement.

To all this, we must add the high number of workers who have been affected by temporary lay-offs (ERTE).

The first coronavirus wave took place during March and June where it was particularly cruel in Italy and Spain with a "black" period in terms of mortality. After the first wave, which caused around 28,000 deaths, with 900 people dying every day, the health system became tired and cracked as hospital overcrowding soared, without knowing that it would not end there.

Chart 3 reflecting coronavirus lethality by age.



Source: Redaccion medica

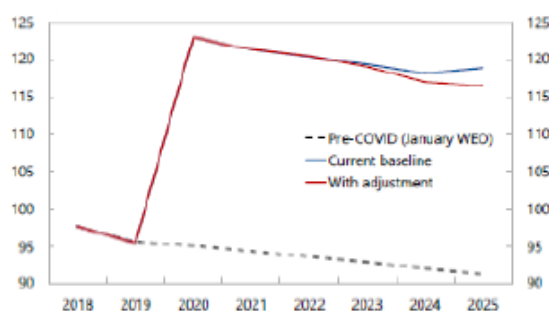
From July we observe what is known as the second wave or new normal where there were restrictions on the mobility of the population such as not being able to leave the autonomous community mortality rates remained much lower either because of the climate or because of the social distance, although it was observed that hospitalization rates increased markedly in some regions because there was no unanimity in the restrictions meaning that each autonomous community was free to take its own measures.

Already past summer and with the eye on Christmas came the hope on December 27, 2020 that would mark a before and after in the pandemic, since it was the day in which a fundamental vaccination campaign began to win the battle to the virus, the contagion curve began to rise due to relaxation during Christmas and becomes the second deadliest wave behind the first.

These were the most important waves as the arrival of a South African variant called omnibus and that the population began to be vaccinated massively causing a decrease in lethality.

The impact of the health crisis has been even more pronounced in Spain, where GDP registered a fall of 11% being one of the most damaged in the group of advanced economies. This decline in activity was not only greater, but also much more pronounced than in previous recessions. Spain started the Covid-19 pandemic with a structural deficit of around 3% of GDP, and a public debt ratio of around 96% of GDP at the end of 2019.

Chart 4 Evolution of public debt



Source: Fondo monetario internacional

The contraction of the economy exacerbated existing income inequality and put more pressure on public finances. Jobs with fixed-term contracts, many of which work in the sectors most affected as Spain has one of the largest temporary employment quotas in Europe, caused a disproportionately high burden of the crisis to be borne.

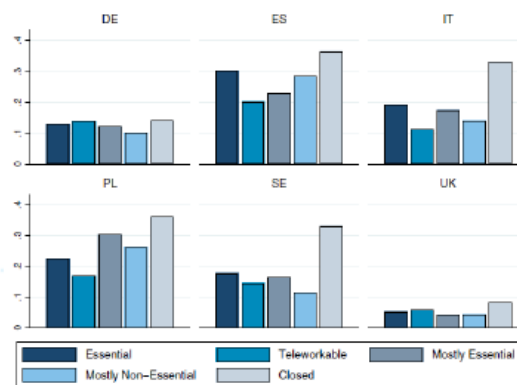
The already high increase in public debt had a medium-term challenge in maintaining public finances and equitably sharing the burden of adjustment and financing. (Chart 5,6)

Chart 5 Percentage of temporary work



Source: Banco de España

Chart 6 Share of temporary work by category



Source: Journal of Industrial and Business Economics

From the point of view of the economic impact we can observe three determinants of the results of the policies implemented by the government

- First, the magnitude of the impact was unexpected and immense, unfortunately we saw that in a short period of time, the pandemic took thousands and thousands of human lives, families who could barely say goodbye to their loved ones, which pushed our healthcare system to the limit. This generated a situation in which the authorities had to decree measures such as social alienation, complete closure of non-essential activities. This led to increased uncertainty about the future which led to a fall in the confidence of economic operators and a sharp fall in the price of many financial assets.

- Second, the crisis was intended as a temporary factor, although it now appears to be coming out, it was more durable than initially expected. The duration of the crisis is uncertain, although at present it seems that the disease is controlled largely thanks to vaccines there are many sectors such as tourism that is returning to pre-pandemic levels, although this crisis hit many sectors structurally.
- Finally, this crisis affects the global economy, which implies that the recession that has been generated in the Spanish economy and the recovery will depend on how it goes to the rest of the countries.

Therefore, observing these characteristics and the seriousness of the situation, the temporality of the pandemic and the global impact of the shock it was going to generate, required actions by the economic policy forceful and coordinated internationally.

A law on extraordinary measures to support corporate solvency was created, these aids were aimed at the sectors most affected with the aim of channeling resources to the economy as a whole and reducing the risk of over-indebtedness that could be hindered by the subsequent economic recovery. The objective of this aid was to protect the productive fabric, maintain employment and prevent a negative impact on public finances and the financial system by avoiding a structural impact on the economy.

In order to avoid the economic impact of the crisis, the most appropriate tool to carry out is fiscal policy in the face of the consequences of the pandemic since through liquidity companies could face the problems caused, Therefore, fiscal policy has the appropriate instruments to achieve these objectives by means of immediate aid to the different sectors and for a fixed duration.

On monetary policy, the European Central Bank (ECB) quickly proposed a coordinated response to the challenges posed by the covid-19 crisis to the eurozone economy, the Euro system approved large-scale purchases of financial assets to enable private actors and tax authorities in the euro area to benefit from low financing costs, other measures to boost banking.

As for the macroeconomic policies of the financial system, they should operate to ensure the flow of credit to the economy and thereby maintain financial stability. The aim is for financial institutions to continue to guarantee the flow of credit to businesses and households affected by the crisis. The aim is to prevent the sharp decline in activity

by increasing market credit risk from generating economic instability. The pandemic increased protectionism, as governments struggled to contain the spread of the pandemic, their policies had an immediate impact on borders and trade through tariff-setting, regulations, which would paralyse the fight against the pandemic and delay and weaken the long-awaited economic recovery.

The need for joint action as regards the members of the euro area as we all share the same currency was the most effective means of ensuring that the economic effects of the pandemic by minimizing costs and time, it should be noted that the impact on different economies has been different among eurozone countries.

We cannot rule out the short- and medium-term effects, the pandemic could cause certain structural changes in the supply and demand of our economies. This is important because the responses of the various economic policies must not only be aimed at temporarily maintaining the income and employees of the companies but also to help the reconstruction.

The rapid spread of covid-19 worldwide and the measures taken to curb it have led to unprecedented negative shocks to the economy, as opposed to a typical macroeconomic shock, policies implemented to contain it have caused disruption of supply and demand in a new environment where consumers on the one hand and businesses on the other face uncertainties in the future.

In terms of supply, company closures, social alienation, the reduction of the labor supply will cause cuts in the supply chain causing a decrease in supply. On the demand side, the increase in unemployment due to layoffs will cause a great loss of income that will lead to the decrease in consumption, savings and investment.

2. Spain as a starting point

To begin analyzing the situation in our country we must bear in mind that the pandemic has hit our economy because tourism-related activities have a very great weight both in terms of added value and in terms of employment. The sectors most affected by the pandemic represent in the case of Spain about 25% of GDP, including restaurants, hotels, transport and retail trade due to restrictions on mobilizing and halting demand caused by the disruption of global production chains.

Secondly, let us look at the Spanish business structure that is the structural

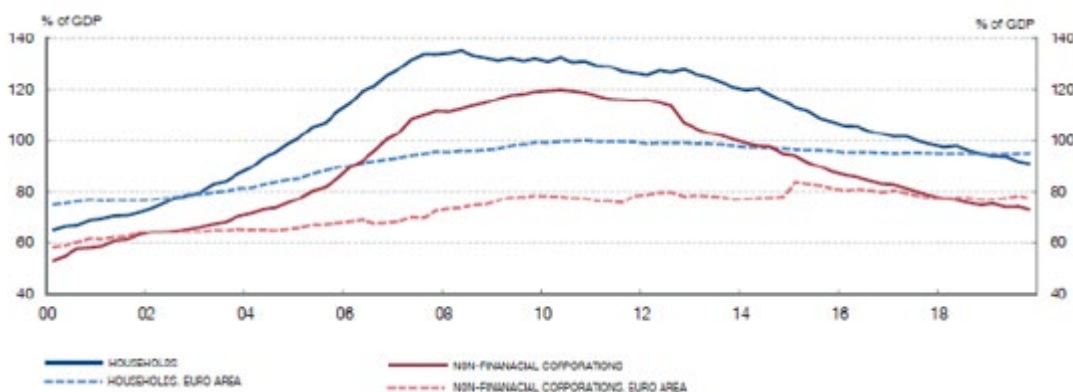
characteristics as we already know in Spain this biased in favor of smaller companies compared to the five largest EU economies, causing a difference between the productivity of the Spanish economy and the economies of our environment.

Finally, this crisis has once again exposed what has happened in previous recessions, when there is a negative shock, there is a destruction of employment on the employed workers. When there is a negative shock, companies can adjust employment in different ways: reducing working hours or reducing employment. However, temporary contracts allow firms to adjust more quickly and at relatively lower cost.

The decline in recruitment reflects the slowing down of productive activity as a result of confinement, this creates a problem in the future to find work for young workers, workers with fewer qualifications, immigrants and groups that tend to have a high turnover.

There are also negative side effects. These could be seen in the increase in public debt. Consequently, just as a short-term fiscal response will help reduce the impact on our economy, a budgetary boost is part of a strategy to recover public finances. This is especially necessary here, since we start from a vulnerable position in public finances, due to high levels of public debt and structural deficits (Chart 7)

Chart 7 Evolution of debt as a percentage of GDP



Source Banco de España

Therefore, measures have been necessary to reduce the impact, banks and the ECB have also helped the Spanish economy by injecting liquidity into the economy. However, despite this aid, public debt is expected to increase exponentially to over 120% of GDP. We must point out that this economic outlook was uncertain because it was related to a strong uncertainty about the duration of the confinement, in addition the absence of a similar precedent history with which we can compare has not been possible making the economic impact of the measures adopted by the authorities

difficult. There is no doubt that the negative effects of the pandemic have been felt globally as every country has been affected by the trade and financial relations that emerged after the Second World War when international trade boomed again. The policies used provoked supply and demand shocks as we will analyse later in an unprecedented economic environment in which economic agents are affected by uncertainty.

2.1 Main characteristics of the Spanish business fabric.

To begin this analysis, let us comment on the main characteristics of the business fabric and because it makes Spain more vulnerable to other European economies.

Firstly, as we have indicated above, activities related to the tertiary sector have a very high weight both in terms of value added and in terms of employment. As we have observed in recent years, social distancing measures have most severely affected sectors such as hotels, restaurants and leisure. Another sector which has suffered was the automotive sector, with the loss of more than 8000 jobs and the closure of numerous dealerships due to the significant drop in demand and the lack of raw materials for cars in our country.

In this case we will analyse the interaction between the Covid-19 outbreak and economic activity as a tool for development purposes. As we know, the Covid-19 pandemic has directly or indirectly affected all countries and all sectors globally. To contain the spread, appropriate measures such as staying at home, travel restrictions and cessation of non-essential activity were taken. These containment measures were accompanied by strong monetary and fiscal stimulus to reduce the impact of the coronavirus on the economy. Social changes and consumption behavior are likely to be sustained even as the measures are scaled up or down, and nowadays the measures are no longer restrictive thanks to the use of effective treatment such as vaccines.

These assessments resulted in numerous loops between disease development and economic activity leading to the emergence of epidemiological and economic models, which are used to analyze trends between numerous outbreaks and economic activity. The impact of the coronavirus has caused numerous effects with implications for different social and economic aspects such as an emergency situation in the health sector, negative supply and demand effects and great uncertainty making the shock unique and unparalleled.

The economic effects of the pandemic are fast becoming apparent and their impact is substantial, such as large contractions in commodities like oil in particular. due to the considered decrease in supply, this contraction is affecting the significantly to commodity-dependent countries. The duration of economic downturns remains a major uncertainty, but this is related to the evolution of the disease or the speed of finding effective treatment. The more developed economies have been better able to adapt to the constraints imposed by an underdeveloped health care system, the possibility of teleworking and the ability to mobilize monetary and fiscal resources to adapt efficiently. Another very important aspect is the response of the population to these measures and the endogenous efficiency in curbing the infection curve.

A practical and feasible model must take into account the fundamental role of economic policies, i.e., economic stimulus by central banks and fiscal authorities have calmed financial markets with the aim of limiting the liquidity of companies as many were unable to meet payments and providing security to the people affected, but the impact and effectiveness in ensuring a sustainable recovery and minimizing the damage remains to be analyzed.

2.2 Economic measures to mitigate the impact of COVID-19 in Spain.

In the following section we will look at public policies to mitigate the impact of COVID in Spain. Due to this public health crisis, the main area is to reform the health system to improve its capacity to treat these situations or to invest in research to find solutions to these types of situations.

In the face of such a shock (temporary, due to an external cause) it is important to minimise losses in the economy to ensure that the stagnation of economic activity and employment is temporary, therefore, this entails a coordinated economic policy response at both national and European level. The overriding aim of this is to ensure that economic activity and employment recover quickly, preventing the circular flow of income in the economy from being interrupted. To this end, the government has presented a series of measures aimed at reducing the impact of the crisis on households, businesses and workers. The approved measures amount to 2.1 billion euros (approximately 1.7% of GDP). Some of them are:

- Securing essential supplies (electricity, water, gas)
- Adaptation to teleworking whenever possible.

- Temporary redundancy procedure known as ERTE is a labour flexibilization measure that enables the company to reduce or suspend employment contracts.
- Tax deferral for SMEs and a reduction in workers' social security contributions.
- Lines of guarantees for companies and the self-employed to ensure liquidity.

The package of measures adopted by the government represents a strong response to the economic impact generated by COVID-19 and proposes that the negative effects on employment and economic activity should be temporary. It is important to stress that all affected sectors need to be supported in order to avoid further damage. The main objective is to protect as far as possible the economic well-being of the population and the productive capacity of a country.

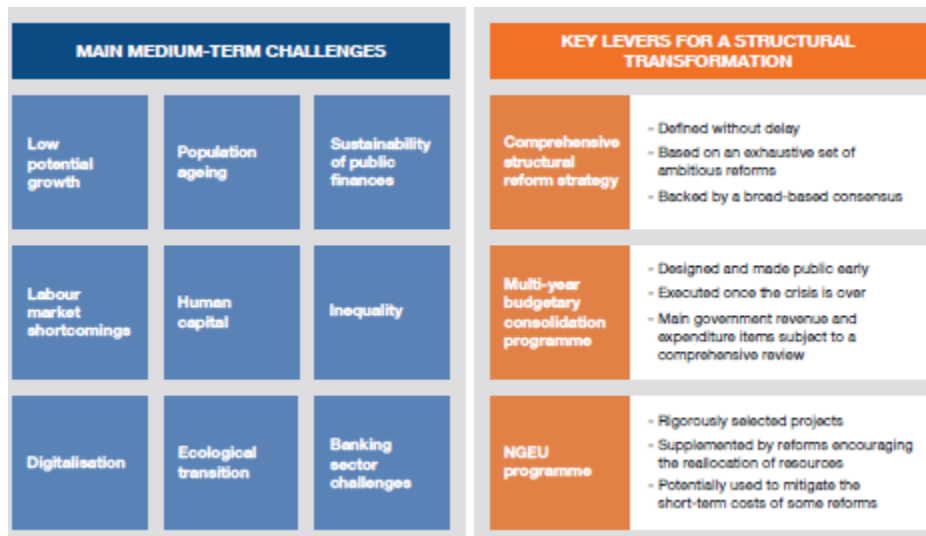
One measure that should be highlighted and the most appropriate given the situation on the part of the government is the use of ERTE's to minimise the number of redundancies. The workers affected by the ERTE will receive an unemployment benefit worth 70%, with a minimum and maximum amount of benefit. What is really important is that the worker-company relationship remains intact, which will allow them to return to work as quickly as possible.

The impact of these subsidies on the public accounts will be significant but manageable, these necessary fiscal stimulus measures will put upward pressure on the deficit and on the public debt causing an increase of more than 5% but should return to pre-pandemic levels as soon as economic activity is back on track.

2.3 Some effects of the pandemic with potentially long-lasting implications

The future outlook for the Spanish economy is conditioned by a number of structural challenges. Before the onset of the health crisis, the Spanish economy was raising the need for potential growth and correcting dysfunctionalities in the goods, factor and labor markets with the aim of strengthening public accounts and major challenges of inequality and population assets. The pandemic has provoked a profound deterioration of the annual accounts and has exposed the main deficiencies in the labor market, negatively affecting some sectors, which has also led to a slowdown in household consumption and business productivity.

Figure 1 Challenges facing the Spanish economy in the medium term and the levers to activate it

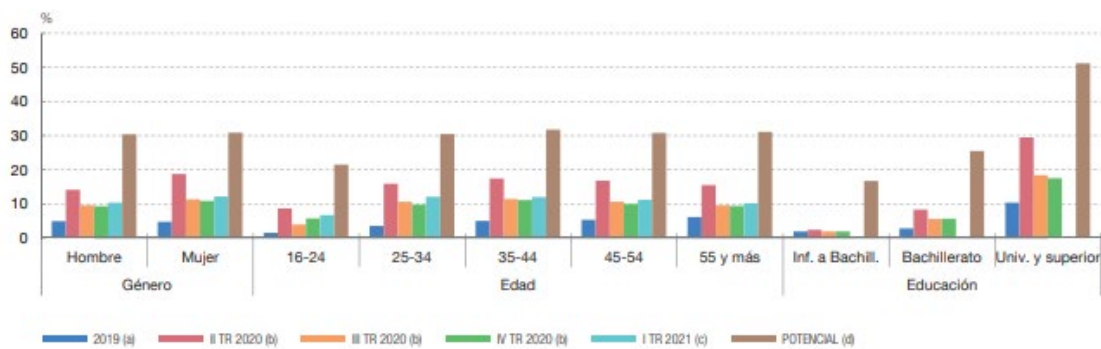


Source: Banco de España

- 2.3.1 Households

Since the beginning of the pandemic, the mobility of the population has changed according to the different restriction measures adopted at national and regional level. There was an unusual increase in people staying in their usual residence and a significant drop in retail outlets and transport stations during the confinement in March 2022. Later, with the arrival of the summer, a recovery was achieved, although not complete, due to the fact that each autonomous community had its own measures. According to the Labour Force Survey (EPA), the reduced mobility during working hours has benefited the increase of teleworking, but once it has been possible to return to work, this modality has decreased again to a percentage of 11%. With respect to the socio-demographic groups that have increased this mobility, we include workers with a university education.

Chart 8 Proportion of people teleworking at least half of the days, according to different characteristics

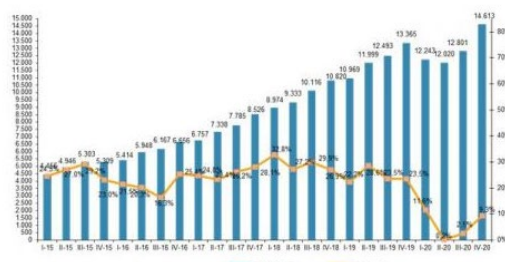


Source: National Statistics Institute (LFS, microdata from the 2019 annual sub-sample and Living Conditions Module 2020).

With regard to Spanish demographics, a small city with a small business size, a high degree of temporary workers and a lower level of investment in assets could limit the growth of this modality according to a survey by the Bank of Spain on business activity (EBAE), which shows that in a given sector, teleworking is increasing more in cities and large companies than the opposite.

The fact of spending more time at home has caused online commerce to benefit from this, according to a survey on equipment and use of information and communication technologies in households by the INE, during March to September 2020, 53% of the population aged between 16 and 74 years made a purchase online in the last three months. This result compares with the same period in 2019, which was 46.9%, so there has been growth in this sector. As we can see in the following graph.

Chart 9 Quarterly evolution of electronic commerce turnover and year-on-year variation (Eur million and percentage)



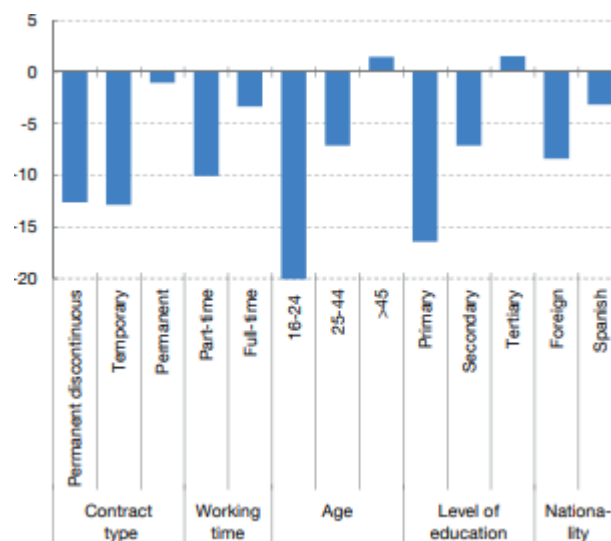
Source: CNMC

The emergence of online commerce with greater intensity is expected to favour competition between different companies and a reduction of those that are less competitive.

- 2.3.2 Employment

The negative impact of the pandemic on employment has had the most adverse effects on the most vulnerable workers, i.e., it has affected the lowest paid workers the most, and this period of deterioration in the labour market has also been felt by workers with temporary contracts, with a fall in employment of 13%. This decline in employment has also had a negative impact on the youngest workers aged 16 and 24, untrained and foreign nationals.

Chart 10 Impact of the crisis, by groups of workers



Sources: Instituto Nacional de Estadística (Labor Force Survey and Quarterly Labour Cost Survey).

Technological innovation and greater intensity of use can accelerate the process of automation in certain occupations, normally those that are monotonous. We should also add that the process does not imply a reduction in the employment rate but rather a need to change tasks, causing a growth in productivity or the creation of new tasks that increase employment demands. This reallocation of employment could be important in Spain in occupations that are now carried out mainly by women and groups with a low level of training.

- 2.3.3 Education

The pandemic has generated a new challenge with respect to the human capital of the new generations; their training is far from the levels observed in different countries of the European Union. The closure of schools and universities for a large part of 2020 meant that teaching was not face-to-face and was carried out from home using computers, in this situation families and schools had to adapt using new methods to continue with online education. Access to computer equipment

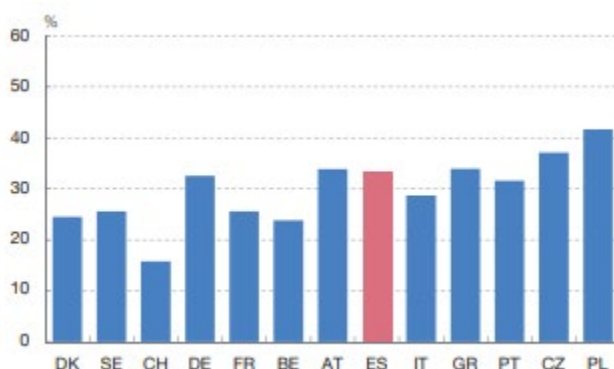
has increased significantly throughout the country, but this method of teaching has had great consequences in the most disadvantaged groups of the population where they had neither access to a computer nor to the internet.

Another problem in Spanish education is the early school dropout rate, which has led the central government and the autonomous communities to approve measures that will lead to better results for the students, who will therefore be favoured.

- 2.3.4 Health

The pandemic has provoked a health crisis with important consequences on the health and well-being of individuals, the risk of increased lethality was associated with the age and health problems of the individual. The comparison of health status by age ranges is particularly interesting, different indicators show that for the older population the proportion of individuals in poor health is higher, in our country 33% of people over 70 years of age have at least two chronic problems and mobility problems.

Chart 11 Comparison of health problems of elderly individuals with European Union countries.



Source: Share ola 6(2015)

The health problems with the highest incidence, particularly among women and people with a low level of education, were depression and mobility difficulties. Depression is substantially higher in women and increases with age for both genders. This increase in depression is due to many phenomena that occurred during 2020 due to the loss of family members and employment, and falls in income. This worsening has been observed in all population groups, but the incidence has been higher in women.

The emotional well-being of individuals was also adversely affected by both the uncertainty surrounding the pandemic and the limitations on contact with loved ones.

In some EU countries, restrictions on medical treatment, which in many places have already come to a standstill, will have long-term consequences on the health of the population.

During 2020 and the beginning of 2021, a significant decrease in the birth rate of the population has been observed, a drop of approximately 20% (according to the INE), which is also reflected in the countries of the European Union due to poor medical care during pregnancy.

- 2.3.5 Inequality

Policymakers and international organizations have expressed concern that rising income inequality in many OECD countries may affect economic growth in several ways. Some wage differentiation between workers in different sectors is necessary to create incentives for investment in human capital. On the other hand, a high level of inequality can increase social conflict, leading to a reduction in investment and incentives to work for certain groups. Spain's position vis-à-vis the rest of the world in terms of inequality can be summarized as follows:

- Spain has a wage/hour dispersion similar to the average of EU countries.
- In annual terms, taking into account days and hours worked, income inequality increases as lower paid groups tend to work fewer hours per day.
- Spain has a high level of income inequality per capita compared to neighboring countries.
- Direct taxes reduce income inequality between households.

Recent years have seen a decline in labor income inequality largely due to the favorable employment performance during the expansionary phase.

The pandemic has led to changes in indicators. A study on the economic effects allows for the calculation of net monthly incomes at the individual and household level at three different dates in 2020, before the pandemic, in the first weeks of the pandemic and at the end of the year. Starting with individual incomes, it can be seen that the individuals interviewed stopped generating income. Household income increased considerably during the first few weeks, and at the end of the year inequality decreased compared to previous months but remained high.

Chart 12 Households without income in Spain



Source: Instituto Nacional de Estadística

3. The importance of the European Union in overcoming the crisis

In the biggest global health crisis in a century, Europe remains united with the 27 Member States to provide an economic policy response as it has had to be very forceful to alleviate the economic effects in the short term and prevent the effects from becoming persistent and affecting the medium- and long-term growth.

The fact that the crisis is global has made the response coordinated among the various member countries and more effective both in the fight against the pandemic and in facilitating the economic recovery of all countries. It should be noted that the crisis is affecting different EU countries very differently, which reinforces the case for joint action.

On the one hand, the crisis is having a very significant heterogeneous impact at sectoral level, which is why the countries of the euro area in which the most affected sectors have a greater weight will be affected.

Second, the increase in national public debt is unprecedented and although it is affecting more the countries hardest hit by the crisis some of them had a lower fiscal margin of manoeuvre which could limit the ability of policies to react national prosecutors, Therefore, there is a need for joint action that allows the crisis to be addressed under equal conditions with the aim of reducing the duration of the crisis and protecting the productive fabric for each and every country in the area. This coordinated action is justified in the context of the crisis and has its origin in a completely exogenous disturbance, the greatest impact is the result of the productive specialization that

countries have developed as a result of the functioning of the single market.

A positive and important impact of the pandemic has been the high degree of coordination that has existed between the various policies and global, European and national decision-making areas.

3.1 Key monetary policies

Here we will discuss how the European Central Bank has intervened in response to the pandemic to prevent the consequences from becoming more severe, at least from an economic point of view.

The appearance of Covid-19 in Europe at the end of February and beginning of March 2020 caused a major economic disruption that required an urgent and effective response to prevent the effects from becoming permanent.

We should point out that the most appropriate tool for this situation is fiscal policy, as it has the instruments to ensure the objective with actions of uncertain and heterogeneous duration.

Monetary policy has acted in a very forceful manner, as the pandemic was initially disrupted by a sharp tightening of financial conditions in the euro area. Financial markets began to see significant falls in economic activity and a rise in public and private debt as European governments announced plans to contain the disease, pushing interest rates up in sovereign and corporate debt markets.

In the first phase of Covid-19 it did not affect EU countries equally but asymmetrically. Countries such as Spain and Italy, which have high public debt, were more affected due to their high dependence on the most vulnerable sectors in this crisis, causing a more pronounced increase in financing costs in these countries. Faced with this situation and with the dual objective of relaxing financing conditions and tackling the fragmentation of European countries, a package of measures was approved that acted mainly in two main dimensions.

In the first package of measures the ECB attaches importance to the strengthening of asset purchase programmes with the aim of improving the financing conditions for companies and public administrations in the value market and on the other hand through long-term refinancing operations to make the ECB's liquidity facilities more accessible to banks.

3.2 Short and medium-term challenges for the economy and monetary policy in the Eurozone.

Since the peak of weakness in the spring of 2020, economic activity in the euro area started on a recovery path, but was subject to a high level of uncertainty.

After a strong rebound in the third quarter of 2020, the GDP growth rate turned negative again as a result of the containment measures. Looking at the major European economies, the largest decline was observed in Spain with a fall of 9.1%, followed by Italy, France and Germany.

Available short-term indicators point to a slowdown in activity so far this year (2020) and it will be time that will determine whether further contractions appear in some countries or sectors. Despite the important news related to the emergence of vaccines, this crisis is expected to be highly persistent and according to some projections the eurozone economy will not recover until the second quarter of 2022. Monetary policy should therefore maintain monetary stimulus until the recovery is solid in order to maintain favourable financing conditions for all sectors of the economy.

The simulations carried out on the impact of the crisis on the fragility of the Spanish corporate sector show the liquidity needs of companies in 2020, although the measures proposed by the different national and international government teams facilitated access to credit with favourable conditions, which substantially mitigated the liquidity risks in the short term. The sharp fall in profitability together with the growth of indebtedness had led to an increase in the proportion of vulnerable companies, of which the most affected have been small companies.

The observable results are an increase of 2 percentage points in the proportion of companies with a risk of becoming unviable by having negative results for two consecutive years and between 3 percentage points and 4.7 percentage points those that will have difficulties in meeting their payments with their expected future revenues.

The following simulation takes into account government interventions since the beginning of the crisis such as ERTE's, aid to households, but not measures focused on strengthening corporate solvency. It also takes into account the high diversity in the evolution of firms' activity across sectors and sizes.

The methodology used in this paper is based on the main items of the income statement and balance sheets between 2020 and 2023 of a sample of 300,000 Spanish companies

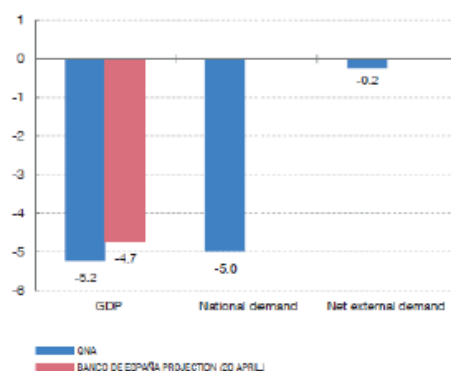
for which this information is available in the central balance sheet registry (BCI). The results are presented for the corporate sector as a whole by size and sector.

4. Macroeconomic analysis

Due to the spread of the pandemic worldwide and the numerous containment measures required, the global economy was drastically disrupted. In the first months of the pandemic, a drop-in activity and employment could be observed, most strongly in the service sector and in those countries where the contagion situation was most severe due to the application of stricter containment measures.

Spain was one of the EU countries most affected by the health crisis and by the impact of the containment measures on the country's economic activity. An initial estimate by the INE (National Statistics Institute) indicated that GDP fell by 5.2% during the first quarter of 2020, bearing in mind that the state of alert only affected the last 15 days of this period. Beyond GDP, the major negative impact of the pandemic on activity can also be seen in employment and in the different macroeconomic magnitudes. Social security registration figures reveal a reduction of approximately 900,000 people in employment between mid-March and the end of April.

Chart 13 Deviation of GDP, domestic demand and net external demand



Source: Banco de España

The resource most used by companies in this situation was the ERTE, as it has been the most prominent element in the behavior of the Spanish labor market since the beginning of the health crisis. At the time of the greatest deterioration in employment (April 2020) more than 3.5 million workers in our country (more than 20% of the total) were affected by ERTE, and it is worth noting that most of them belonged to service sectors. Despite the fact that from March 2021 onwards a

growth path was observed, 740,000 workers were still under ERTE. ERTEs involve the maintenance of the contractual relationship with the company, pending the resumption of activity, although there is no effective employment provision. This measure was very effective in mitigating the initial impact on employment, as without this measure the decline in labor activity would be greater.

Chart 14 Social security contributions



Source: Banco de España

Another negative impact was the case of the self-employed due to the fact that approximately 1.3 million have applied for the unemployment benefit, also exempting the payment of social security contributions. A study by the University of Granada on the situation of the self-employed in the COVID crisis shows the conclusions on the impact of the coronavirus on the business fabric:

- 55% of the self-employed have continued with their economic activity
- Teleworking is gaining importance for the maintenance of economic activity
- Little aid and some that has not been forthcoming

Estimates of the duration of the pandemic and the effects of the shock on the economy remain subject to uncertainty. Firstly, we need to monitor the course of the disease and, at present, the process of influenza pandemic influenza is underway, as the infection-to-function ratio is not as severe, which will, in the second place, prevent the closure of activities so that there is no permanent loss of jobs and closure of businesses.

It should be borne in mind that the characteristics of our productive system,

small/medium-sized enterprises, high dependence on the tourism sector, temporary employment rates, make our economy more vulnerable than the rest.

5. Integrated epidemiological-macroeconomic model

In this case we are referring to an epidemiological-macroeconomic model to analyse the relationship between the COVID-19 outbreak and economic activity, which will allow us to develop a framework in which we will look at the trade-offs between saving lives and maintaining the economy under the imposed policies.

The model presented below is an extension of the SIR (susceptible, infected, recovered) framework of Kermack and McKendrick (1927). The temporal frequency of the model is daily, we differentiate between diagnosed and undiagnosed infected individuals. The former comprises reported cases while the latter represent the unobserved part of the population and are therefore likely to underestimate the true extent of infection in countries where testing is rare. This model allows us to simulate specific relevant mitigation policies to uncover the range of health and economic trade-offs imposed by this crisis.

5.1 Epidemiological block

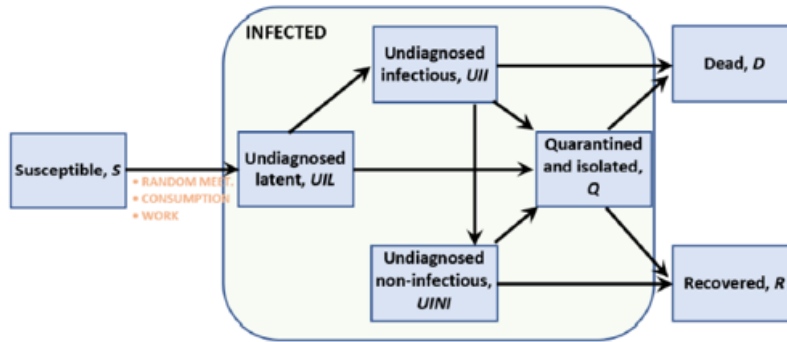
In the next block we are presenting the main health statuses in relation to the population: Susceptible (S) as individuals at risk of becoming infected, Undiagnosed Latently Infected (UIL) infected individuals who are not yet diagnosed and do not have sufficient viral load to infect others, Undiagnosed Infectious Infected (UII) who are unidentified but have developed sufficient viral load to infect others, undiagnosed infected (UINI) individuals in the late stage of infection unable to infect others due to insufficient viral load, quarantined diagnosed infected (Q) consisting of infected, recovered (R), dead (D) individuals, therefore the population (T) is:

$$T(t)=S(t)+UIL(t)+UII(t)+UINI(t) +Q(t)+R(t)+D(t)$$

The dynamics of the epidemic is developed through the expression, through the exposure of susceptible individuals (S) to an infectious individual either at work, purchase of goods or random encounters caused some of them to contract the virus and become infected therefore we denote the three possible ways of becoming infected as follows: Work (L), Consumption(C) and random encounters

(RM), therefore the flow of new infections determines the change in the susceptible group:

Figure 2 Epidemiological block



Source: Document of John Ansah, Natan Epstein y Valeriu Nalban

The probability of infection is more frequent in work, consumption and random gatherings, so this flow of new infections determines the variation in group change.

$$\Delta S(t) = -\beta(t)\gamma(t)\sum \omega_j \alpha_j(t) j \cdot [1 - \kappa \cdot \tau(t)]$$

β is the probability of infection given a contact between susceptible and infected individuals while γ is the frequency of contact, ω_j is used to calibrate the relative proportions of infections, α_j reflects the mode of contact between infected and susceptible disaggregated by activities. For workplaces ($j=L$) it is determined by the labor fraction of susceptible and undiagnosed infectious workers who can access the labor market $\frac{LS \cdot LUII}{LT}$; For consumption ($j=C$) is proportional to the share of total output (Y) consumed by the undiagnosed infectious population, $\frac{UII}{T \cdot Y}$, for random assemblies ($j=RM$),

similar to the reference SIR model, is the product of the set of susceptible and the population share of undiagnosed infectious individuals, $S \cdot UII/T$. Finally, the term $[1 - \kappa \cdot \tau(t)]$ represents the current fraction of the infected population

$$\tau(t) = \frac{UIL(t) + UII(t) + UINI(t) + Q(t)}{T(t)}$$

, where we represent that the reduction in virus transmission in case of additional voluntary social distancing. This extension of the model has a relationship between the decrease in mobility and the number of reported cases.

The evolution of undiagnosed UIL infection is determined by new infections minus individuals who have developed a viral load to spread the virus.

$$\Delta UIL(t) = \beta(t)\gamma(t)\sum j \omega_j \alpha_j(t) \cdot [1 - \kappa \cdot \tau(t)] - \frac{UIL}{x} - \Phi(t) \frac{UIL(t)}{\delta}$$

In this case the parameter x shows the period between virus contraction and infection, and the parameter δ represents the average period to identify an infected person, $\Phi(t)$

is the time-varying quarantine fraction.

5.2 Macroeconomic block

In this block we study the indirect effect of the pandemic on economic activity, which manifests itself in the reduction of labour supply, which will lead to a decrease in output. Following the relevant literature, we abstract from other factors of production, such as capital services. With this simplification the author recognises the priority of labour in determining output under measures of social distancing. Labour input in terms of number of workers is the sum of labour supplied by each of the health groups, $\{S, U_{IL}, U_{II}, U_{III}, U_{INI}, Q, R, D\}$, the latter is calculated as the total population of the group adjusted by working age population $\frac{WAP_i}{i}$, employment rate $\frac{L_i}{WAP_i}$, share of persons in labour service provision and distancing social responsibility $[1-\kappa \cdot \tau(t)]$.

$$\begin{aligned} Y(t) &= Z(t)L(t) \\ &= Z(t)\sum_i(t) \cdot WAP_i(t) \cdot i(t) \cdot L_i(t) \cdot WAP_i(t) \cdot share_{work_i}(t) \cdot [1-\kappa \cdot \tau(t)] \cdot i \\ &= Z(t)\sum_i(t) \cdot washare_i(t) \cdot emplrate_i(t) \cdot share_{work_i}(t) \cdot i \cdot [1-\kappa \cdot \tau(t)] \end{aligned}$$

The production function also allows for the presence of a total factor productivity term, z which will be used to simulate investment in digital equipment to facilitate teleworking. Government mandated restrictions play a key role in curbing the spread of infections during the epidemic. In the following alternative formula, we close the social behaviour of the population ($K=0$) and add the new infections term and the production function a time-varying variable that approximates the impact of labour supply restrictions.

$$Lockdown(t) = [1-\theta(t) \cdot P(t)]$$

A larger or stricter P (higher θ) indicates that containment reduces the spread of the virus but this has a negative impact on production, creating a dilemma between saving lives and trying to save the economy.

5.3 Model Calibration

The scientific community continues to learn about SARS-CoV-2, which implies large uncertainties in the model parameters. For several specific parameters we use economic and epidemiological data from Malaysia, this choice of country is motivated by several economic and social structural indicators that are close to the group average. Malaysia is a medium sized country with a population of (32.4 million in 2018) and an economy with a nominal GDP of USD 364 billion in 2019. It is a very open economy (the sum of exports and imports exceeds GDP) where they are characterized by exporting both

electrical and electronic products (38% of total exports). Following the structure of the integrated model, the parameters can be divided into two groups: those specific to the epidemiological block and the economic ones. The table below shows the calibration of the epidemiological block.

Table 1 Model calibration: Epidemiological block

Notation	Value	Description
χ	4	Latency period
σ	10	Duration of infectiousness
ψ	1/21	Recovery rate
ρ	0.0025	Mortality rate
β	0.15	Probability of infection given contact
$\gamma(t t < 58)$	5	Contact frequency before emergency state declared
$\gamma(t t \geq 58)$	2	Contact frequency after emergency state declared
δ	5	Isolation delay
ϕ_0	0.05	Quarantine fraction under no infection
ϕ_1	10	Quarantine fraction sensitivity to infection rate
ω_c	0.17	New infections share from consumption activities
ω_l	0.33	New infections share from labor activities
ω_{RM}	0.5	New infections share from random meetings

Table 2 Model calibration: Epidemiological block

Most of the parameters are within the range of values used, the latency period (χ) is set to 4 days and the duration of infectivity (σ) is set to 10 days. The transition period from non-infective to recovery state (given by the inverse of ψ) is calibrated at 21 days. The mortality rate (ρ) is set to a lower range of the values considered, there is a positive correlation between deaths and admissions found in Goldberg and Reed (2020). The probability of infection given by contact (β) is set at 15% while the frequency of contact (γ) is assumed to decrease from an average fraction of 5 people to 2 people per day once the government declares a state of alarm, reflecting changes in social behavior in the population. The isolation/quarantine fraction is assumed to be determined by the ability to quarantine 5% of the previously undiagnosed infected, taking an average period of 5 days to identify them.

A second set of parameters is related to the macroeconomic block. In Table 2, for simplicity we assume that the working age ratio and the employment rate are constant across health groups and over time. In the case of Malaysia as we have indicated we will take as an example; they represent approximately 70% in 2018 (according to data from the Malaysian Department of Statistics).

The proportion of people in all health groups who are assumed to work *sharework* can be gauged by approximating the specific sectors or social behavior of workers who may say asylee or telework. In the scenario we have assumed all susceptible, latent unidentified and recovered individuals are at work. Only 50% of undiagnosed infectious and non-infectious individuals are working (even some of them are asymptomatic).

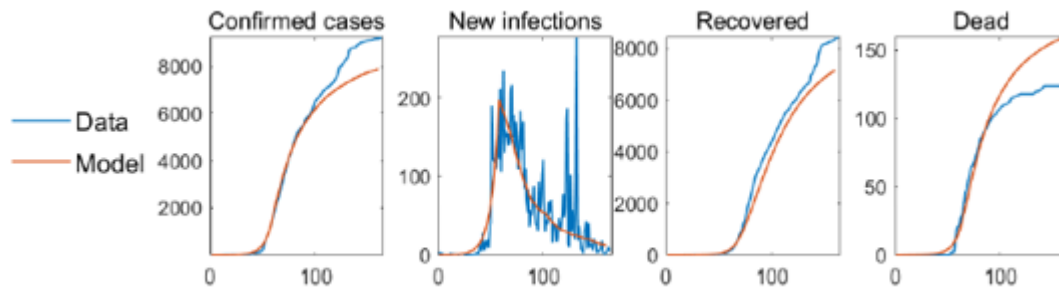
Quarantines are restricting the labor market.

The sensitivity of contact frequency to infection risk, k , is set to 1, since it is not a standard parameter when $k=1$ we assume that there is no blocking policy or set of policies i.e., $\theta=0$, under the assumption that the impact of restrictions produces changes ($k=0$) and blocking measures we assume that the efficiency parameter $\theta = 0.75$.

5.4 Matching epidemiological data for Malaysia: An illustration

To illustrate the results of this simulation, we are referring to the epidemiological data reported for Malaysia between the end of January and early July 2020 (sourced from the Malaysian Ministry of Health), new confirmed cases, recovered individuals and deaths, the results are presented in the figure below.

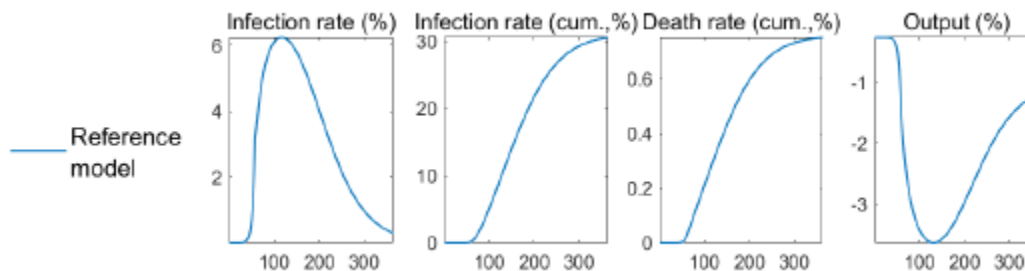
Figure 3 Matching Malaysia data



The pattern is almost coincident with COVID-19 cases, especially during the initial period (during the first three months). Regarding the one-day peaks in new infections around 120-130 (from late May to early June).

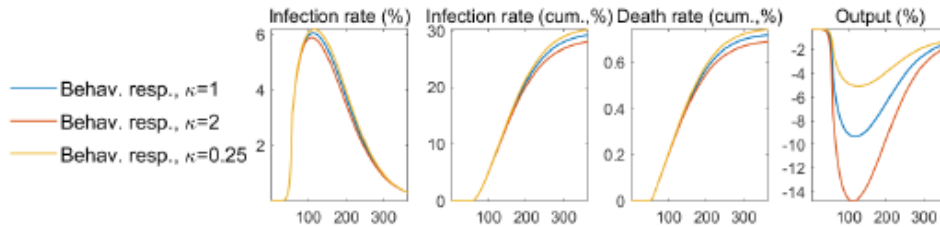
Next, using the extended SIR model, we will look at how mitigation policies have been implemented. First, we present the baseline model without any government behaviour.

Figure 4 Reference Model



This first graph shows a model without any constraint $K=0$, $\theta=0$, this model yields results of 1/3 of the population affected and a mortality of 0.8%. These costs represent a loss of GDP of approximately 2.2%.

Figure 5 Response in the behavior of the population

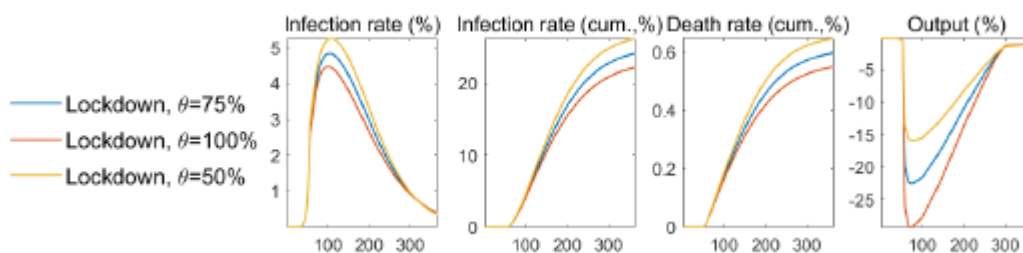


In this situation we already observe some restrictions in mobility ($K=1$), this reduction in contact frequency reduces the spread with fewer infections and deaths and a decrease in production, but in particular leads to an increase in GDP of 4.8%.

- **Lockdown Policy**

This blocking policy is based on the exogenous trajectory of the proportion of restricted interactions, followed by a slow recovery after some restrictions were lifted. The parameter $\theta=0.75$, the prevalence of infection is reduced by 23% and the mortality rate by 0.6%, while production decreases by 9%.

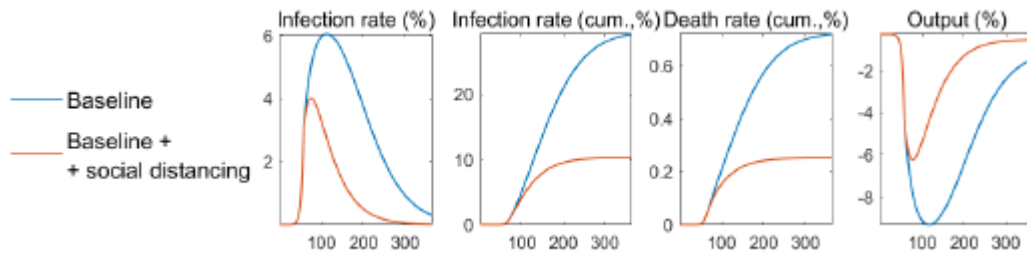
Figure 6 Lockdown policy



- **Increased social distancing**

The fear caused by the pandemic has led to social alienation around the world. The use of masks, small groups and closed leisure activities are aimed at reducing the spread of the virus. In this case, the results of the simulation are a decrease in the infection rate of 10%, the mortality rate of 0.25%, while the GDP decreases by 2%.

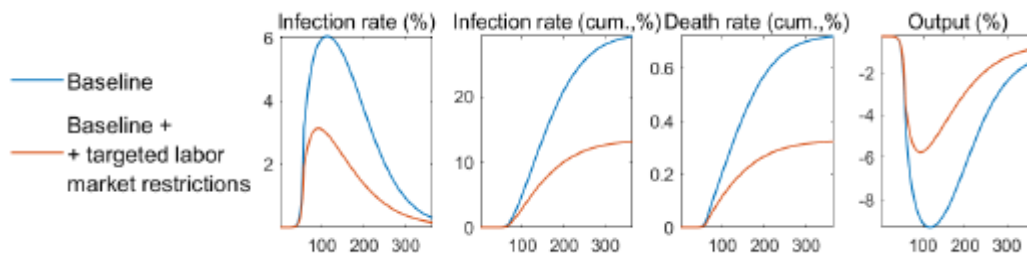
Figure 7 Social distancing



- Labour market

In this case the author refers to specific restrictions in the labour market, as due to the tests performed, people who were positive had restricted access to workplaces. This gives changes in undiagnosed latent (UIL) from 1 to 0.5 and in undiagnosed infectious (UII) and non-infectious (UINI) from 0.5 to 0.5, (UINI) from 0.5 to 0.25. The results obtained represent production gains.

Figure 8 targeted labor market restrictions



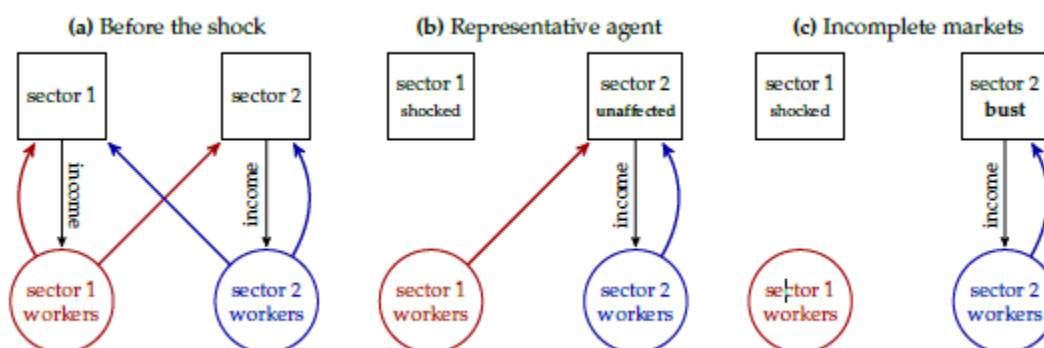
6. Macroeconomic implications of Covid-19. Can negative supply shocks cause demand shortages?

In the next section we are going to talk about the theory of Keynesian supply shocks, these shocks trigger changes in aggregate demand that are much larger than the effect of the shock. We are talking about economic shocks associated with the pandemic such as closures, layoffs of workers and the closure of firms. In an economy dominated by a single sector, supply shocks are never Keynesian, a result that extends to economies with incomplete markets and where consumers have liquidity constraints. In contrast, in economies with multiple sectors, Keynesian supply shocks are possible under certain conditions, most predominantly in incomplete markets that have certain characteristics that provoke these supply shocks. The closure of numerous firms and the destruction of

employment can increase the initial effect by triggering an economic recession. Fiscal or monetary stimulus can be more or less effective depending on its effects.

The famous quote by Jean-Baptiste Say where he states that "supply creates its own demand" where at this point we are going to argue as we could describe it as "supply creates its own excess demand", a negative supply shock can trigger a shortage of demand that causes the contraction of production and employment greater than the supply shock, in this case as we see the pandemic has caused these shocks on the one hand the decrease in world production and the exponential increase in unemployment. A simple idea about the effects of Covid-19 is a comparison of aggregate supply and aggregate demand and where the shock has a greater impact. There are theories of economists such as, for example, Gourinchas (2020) where he favours macroeconomic measures aimed at flattening the recession curve. This model is based on the assumption that supply and demand forces are intertwined, i.e., demand is endogenous and is affected by supply shocks and other characteristics of the economy. The idea is that when workers lose their income, they cause a contraction in aggregate demand through reduced spending.

Figure 9 How negative supply shock can lead to demand shortages



In single-sector economies the answer is negative: supply-side shocks dominate, the outcome is familiar in a representative agent economy, and less surely in incomplete markets the income loss mechanism is present and can have large effects on aggregate demand.

When shocks are concentrated in multiple sectors, as has occurred during the pandemic, there is a greater chance that spending will be significantly reduced. On the supply side, the closure of firms causes shadow prices to rise in the affected sectors, increasing the price on the consumer, and a second reason is the lack of availability of goods, which can shift spending to other sectors through substitute goods.

The figure shows how a supply shock can cause a shortage of demand. In incomplete markets, if workers in the affected sectors lose their income, their consumption automatically decreases; to compensate for this, workers in the unaffected sector should increase their spending in the affected sector, but this requires a higher degree of substitution between sectors. Section (b) shows the frontier case in which both elasticities are equal and sector 2 is not affected. Finally, in (c) with incomplete markets sector 2 goes into recession because of the reduction of workers' expenditure in sector 1. In order to take into account, the effect of firm closures we introduce varieties in agents' consumption. For example, in this crisis Keynesian forces reduce demand in other sectors (automobiles) which means that other businesses cannot stay open due to this decrease in demand.

In the following, we will analyse how supply shocks have acted in different markets.

6.1 Single Sector: Standard Supply Shocks Even with Incomplete Markets

In a single-sector economy supply shocks have a standard feature, they never cause demand effects large enough to dominate the effects on the supply side; this is applicable in economies with incomplete markets and heterogeneous agents. In this case, the model shows us a unitary set of agents whose preferences are represented by the utility function:

Where C_t is consumption and $U(c) = \frac{c^{1-\sigma}}{1-\sigma}$, is a standard utility function where each agent is endowed with $n > 0$, and competitive firms produce through labour using linear technology.

$$Y_t = N_t.$$

The supply shock that we are going to introduce in the economy has reference to the pandemic, a random fraction $\phi > 0$, can't go to work in period $t=0$, causing that in some sectors it is not safe to work for various reasons such as social interaction, policies motivated by governments causing that these agents cannot supply their labour endowments in the current period, we will assume that from period $t=1$, agents will be able to supply again.

To obtain the effects of the supply shock we will rely on two basic indicators: the (natural) interest rate and the response of output to this interest rate, these indicators will reveal whether the shock is Keynesian or standard. In complete markets the (natural) interest rate rises and aggregate demand falls less than aggregate supply at a fixed real interest

rate, while in incomplete markets the (natural) interest rate falls and aggregate demand falls more than aggregate supply at a fixed real rate.

- Complete Markets

With respect to complete markets, we can consider that a supply shock reduces the labor supply of the representative agent of n to $(1-\Phi)n$ during period $t=0$. Let us consider that labor is fully employed, the effect of the shock is mechanical, consumption falls at $t=0$ before returning to its previous level, and the interest rate rises above its previous level.

$$1+r_0 = \frac{1}{\beta} \frac{U'((1-\Phi)\bar{n})}{U'(\bar{n})} > \frac{1}{\beta}$$

In this economy an increase in the natural rate of interest means that there is excess demand to demonstrate this idea we will assume that nominal wages W_t are downward, if the demand for labour falls wages do not change all of them assuming that firms are perfectly competitive, therefore nominal wages and prices are equal $P_t=W_t$, and the real wage $W_t=1$.

- Incomplete Markets

With an economy of incomplete markets, the shocks are less evident as the agents affected by the shock lose income and therefore reduce spending. In this case we will indicate a fraction of the agents that we will call restricted agents, with the same fraction in both sectors. The economy starts in a steady state, the agents affected by the shock see their income fall to 0 and therefore their consumption also falls to 0, while some agents, due to their preferences, can smooth their consumption by satisfying the Euler equation. In this model the natural rate of interest increases in response to the shock.

6.2 Multiple Sectors: Keynesian Supply Shocks

By including more than one sector, we observe the different supply shocks we want to apply, the rapid spread of the pandemic and the associated containment policies have had asymmetric effects on different sectors with services being the most affected. In this section we will work with two sectors 1 and 2, where a fraction of the agents ϕ work in sector 1, and another fraction $(1-\Phi)$ work in sector 2, assuming that workers are specialised in their sector.

The supply shock in this case will be one that prevents agents in sector 1 from working, consumption and production in this sector may require consumers and producers to meet, whereas in sector 2 it can take place without any personal contact. Measures put in place by governments limiting contagion may prevent workers in sector 1 from working. In this case the technology to produce goods is linear.

$$Y_{jt} = N_{jt},$$

Firms in sector j , hire workers with the wage of each sector W_{jt} , selling the good with flexible prices depending on the technology the price of the good will be: $P_{jt} = W_{jt}$. Consumer preferences are represented by the following utility function:

$$\sum_{t=0}^{\infty} \beta^t U(C_{1t}, C_{2t})$$

Now we will observe the behaviour of this multi-sector economy in the same way as we have done above except with the single sector.

- Complete Markets

Let us consider that the economy is in an initial state, before the shock occurs, assuming that the economy is at full employment and prices adjust flexibly, the equilibrium allocation is as follows:

$$C_1^* = Y_1^* = \Phi n, \quad C_2^* = Y_2^* = (1 - \Phi) n$$

By symmetry we will determine that the price of ben 1 in terms of good 2 is: $P^* = 1$.

With respect to the interest rate $1 - \beta$, since in the initial situation consumption is constant, for reasons that we will see below we will focus on a real interest rate in terms of good 2, so that it is defined as:

$$1 + r_t = (1 + i_t) \frac{P_{2t}}{P_{2t+1}}$$

Where i_t is the nominal interest rate, the interest rate $(1 + r_t)$ is when it enters the Euler equation for good 2. In period $t=0$, when there is a supply shock, production in sector 1 stops, therefore:

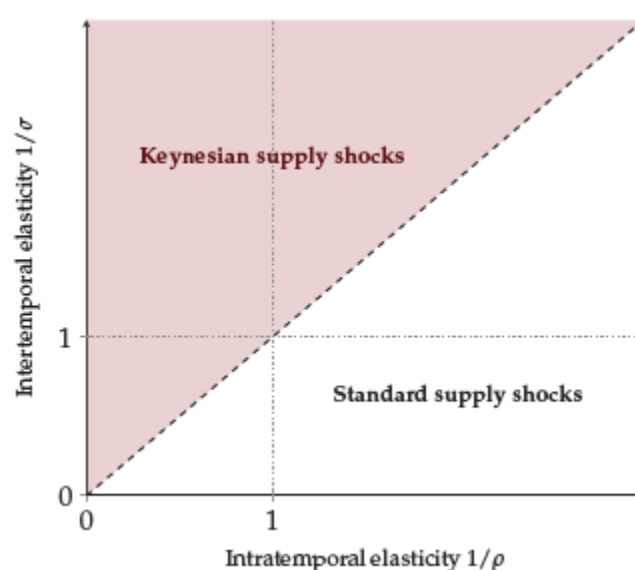
$$C_{10} = Y_{10} = n_{10} = 0$$

The inevitable effect of the shock is that in sector 1 employment falls, the shock is temporary and the economy returns to steady state at $t=1$. As we have done before we will observe what has happened to the real interest rate and what happens to aggregate demand if the central bank keeps the real rate unchanged. To do this we will use the Euler equation of the representative agent after the shock: (We will denote the term U as the partial derivative of C).

$$1 + r_0 = \frac{1}{\beta} \frac{U_{C2}(0, C_2^*)}{U_{C2}(C_1^*, C_2^*)}$$

The natural rate of interest decreases due to the epidemiological shock.

Figure 10 When are supply shocks Keynesian with a representative agent?



If the inequality is satisfied, the two goods are complementary. A fall in good 1 increases the marginal utility of good 2, so that it acts as a negative demand shock for good 2. A fall in the interest rate could provide an incentive to consumers to continue to consume a sufficient quantity of good 2 and to maintain employment in n . In contrast, if the elasticity of substitution between the two goods is greater than 1, the goods are substitutes, so a shock in sector 1 would lead to an increase in goods in sector 2, causing wages to rise leading to inflation and subsequent intervention by the central bank to increase the nominal interest rate to keep inflation constant.

- Incomplete markets

As discussed above, we will use a simple description of the incomplete model, a random portion of households μ is subject to the borrowing constraint and all households have the same initial wealth $a_i0=0$. To derive the natural rate of interest we will focus on groups of agents that are not subject to constraints. We will denote goods 1 and 2 as c_{1t} and c_{2t} , because the preferences of these consumers are homothetic, we have Gorman aggregation, if the Euler equation is satisfied individually, it is also satisfied for the whole group.

$$1+r_0 = \frac{1}{\beta} \frac{U_{c2}(0, C_{20})}{U_{c2}(C_{11}, C_{21})}$$

To make an evaluation of this equation we will consider the labour market compensation condition for sector 2 in period $t=0$, given that constrained households do not consume anything the labour compensation requires:

$$C_{20} = (1-\Phi) \bar{w}$$

During period 1, unrestricted households earn a total income and consume a fraction of good 1 and good 2 to obtain the consumption levels:

$$C_{11} = \Phi (1 - \Phi\mu) \bar{y} \quad C_{21} = (1 - \Phi) (1 - \Phi\mu) \bar{y}$$

Substituting the consumption levels in the above equation:

$$1+r_0 = \frac{1}{\beta} (1 - \Phi) (1 - \Phi\mu)$$

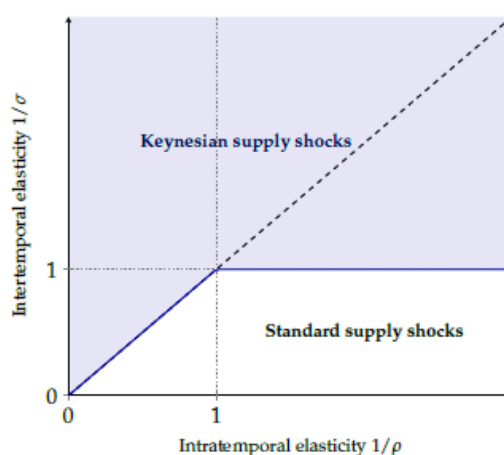
Note that the right-hand side is equal to $1/\beta$ when the parameter $\mu=0$. In complete markets this lower bound is given by the elasticity of substitution, in this case in incomplete markets this condition is considerably relaxed.

If the fixed real interest rate (r_0) is set by the central bank, the relationship between labour demand and labour supply in sector 2 is:

$$\frac{n_2^0}{n} = (1 - \Phi\mu) (1 - \Phi)$$

Under this condition the supply shock has Keynesian effects: demand falls below labour supply causing a recession in sector 2.

Figure 11 Supply shocks with incomplete markets



Comparing with complete markets, aggregate demand falls more in incomplete markets because agents cut back their spending due to the loss of income and this directly affects aggregate demand.

For our model fiscal policies through spending or taxes are not effective because there is a sector that is closed and therefore no one can spend in that sector so all the money spent by agents or government goes to sector 2 and therefore is ineffective in a recession caused by a supply shock.

To find an optimal combination of macro and pro-health policy we assume that the shock is temporary and unexpected so that unemployment and declining activity are inefficient. There are complementarities between public health policies and maintaining stable

aggregate demand, because pro-health policies can produce a Keynesian supply shock and macroeconomic policies can be useful to correct these failures.

7- How has Covid-19 affected the productive sectors?

The pandemic has triggered an unprecedented health emergency that has affected all economic sectors. Some have the resources to cope with this crisis while others face greater difficulties. Consumer demand patterns are changing, supply chains are being reinvented due to market uncertainty.

7.1 Primary sector

The agri-food industry has been one of the sectors that has continued with its economic activity even with the state of alarm, given that it is an important sector as it is responsible for supplying food and avoiding the food shortage crisis to markets and large supermarkets, acting as intermediaries and bringing the food that these agricultural and livestock producers make available to the population. It should be noted that not all regions are affected in the same way by this situation, i.e., those where the countryside occupies a larger part of the population are more affected than in others where the primary sector is not so important. It is also worth highlighting the mainstay of the primary sector, fishing, which is by far the hardest hit by the pandemic due to the closure of establishments.

Despite this, the agri-food sector has shown a very favourable evolution, the added value of the primary sector grew by 3.6% quarter-on-quarter in the second quarter of 2020, a quarter that was marked by the confinement where the consumption of basic necessities increased considerably, thus the primary sector gained weight in the economy as a whole, as the confinement itself led to an increase in basic necessities. A second factor that would explain the good performance of the sector during the coronavirus crisis is of a more structural nature and is related to the good positioning of agri-food products in international markets due to the internationalisation efforts of recent years.

The adjustment of employment in the months of confinement and its subsequent recovery has been very uneven across sectors of activity. In the primary sector, the number of people affiliated to social security fell by 1.9% year-on-year in the second quarter and by 2.4% in the manufacturing industry. In the manufacturing sector, too, there was little use of the instruments proposed by the government to contain the destruction of employment, a percentage of employees with ERTE in the primary sector

was 0.5% and 11.8% in the agri-food industry. The percentage of self-employed in the primary sector reached 3.5% in May 2020, therefore we can conclude that the agri-food sector has registered less job destruction in the primary sector than in the agri-food industry. employment and a smaller proportion of workers affected by ERTE the recovery of social security membership has been taking hold over the summer.

7.2 Secondary sector

The industry is being one of the sectors least affected by the crisis of the coronavirus since the paralysis of the economic activity announced by the government has not affected them in large part by the reorientation and the ability to adapt to the new times in which the different industrial plants in Spain have been subjected.

Many of the Spanish industries, without taking into account their previous activity, have had to adjust their production to the manufacture of sanitary material in a high percentage of their plants and in some cases, exclusively. For example, plants that distilled alcohol for drinks, in times of pandemic they went on to manufacture hydroalcoholic gels.

Until now Spain and much of the countries of our environment and of the entire developed West depended to a great extent, third countries located in South-East Asia or parts of Africa for manufacturing production because of the cost savings they could make. Due to the global pandemic and with much of the beginnings of the supply chain unemployed (mostly based in China) is when large countries like Spain, France, Germany and the United States have realized the importance of having a domestic production so that in extreme situations such as the one currently experienced, the supply of goods can be guaranteed.

Within the secondary sector one of the main sectors most affected by the Covid-19 has been the automotive, since neither the declaration of the state of alarm nor the fear established by the contagion has been the trigger for the main closure. The trigger has been the lack of supplies and the breakdown of supply, this shortage was motivated by the high dependence of components, parts and raw materials from China, since today is considered as the factory of the world. Wuhan alone being ground zero of this crisis accounts for more than 7% of the production of electric vehicles.

As a result, many major factories such as Seat, Renault, Nissan have agreed with

trade unions to terminate thousands of contracts, causing an increase in unemployment.

Due to this concern in the sector, an extraordinary fund was set up to help the sector to recover the industrial and market recovery, as it was aware of the impact and future consequences on the whole economy.

On the other hand, liquidity and fiscal measures were implemented in order to compensate for the lack of activity by making payments, loans, basic supply costs, etc. more flexible.

We must also highlight the important role played by the construction sector in the Spanish economy. For the most part, construction companies have not been affected, since the closure has not affected them, as economic activity has not been paralyzed, therefore construction has managed to escape the economic consequences and has maintained its 10% contribution to GDP.

7.3 Tertiary sector

The tertiary sector is one of the main pillars of the Spanish economy. According to the latest data published by the company IHS Markit, the PMI index has fallen from 52.1 points to 23 points, i.e., a fall of approximately 50%.

The PMI indices are a sample of the confidence of consumers and companies elaborated by conducting direct surveys of a multitude of companies. The slump of this sector during the second quarter of 2020 adds to the fall of the other sectors analyzed.

The tourism sector was one of the hardest hit sectors, with tourism activity, which before the pandemic represented approximately 12.4% of GDP, falling to 5.5% in 2020 due to global restrictions.

In the following graph we can observe the annual variation in a decade of tourism GDP in relation to the total Spanish GDP.

This sharp drop implies that the entire value chain has been affected by the considered decrease in tourist trips, such as distribution companies, car rental companies, hotels.

In the following graph we will observe the arrival of tourists and the expenditure of international tourists. According to data published by the National Statistics

Institute (INE) between March and September 2019, Spain managed to attract a total of 58.5 million tourists, data that will certainly not be reached in 2020.

According to a study by Exceltur, the most affected autonomous communities were the Balearic Islands, Catalonia and Andalusia, with losses exceeding 800 million euros.

Restaurants represent an average of 4% of GDP in the economy and the fall in activity has had negative repercussions for both activity and employment. Restaurant bookings fell by 99%, but it must be acknowledged that the standstill in activity was never total, as they had to adapt to the conditions imposed.

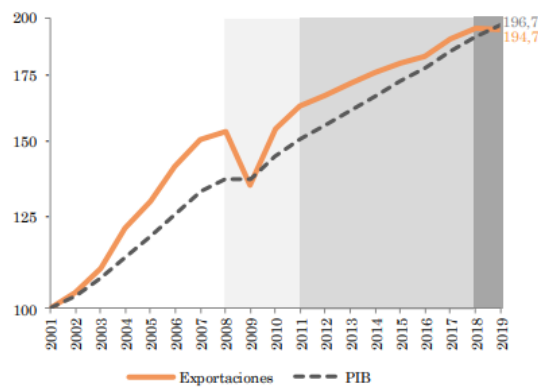
Finally, with respect to the transport sector, the value added in the sector corresponds to 4.5% of GDP, road, air, rail and maritime transport has been disrupted by country restrictions. This has meant that the value chain and the fall in demand for commodities have reduced shipment volumes.

It should also be noted that this sector has experienced better conditions in two respects. On the one hand, companies in the sector have benefited from lower fuel prices (due to lower demand) leading to cost savings, and on the other hand, due to the confinement, orders at courier companies have increased.

8. The effects of COVID-19 on international trade

International trade has been hit by COVID-19, which had already been declining in previous years. The World Trade Organization (WTO) forecasts a fall from 12.9% to 31.9%, although the pre-pandemic level could be restored by 2021. This will have a negative impact on the Spanish economy as international trade accounts for 23.3% of GDP. Global forecasts indicate that the sector most affected in terms of exports of goods will be the automobile sector due to the lack of raw materials from Asian countries. Both public and private efforts are needed to keep export markets active for when trade returns to normal, based on consolidated production and reconstruction for future growth.

Chart 15 Evolution of goods exports and GDP, 2001-2019. World total



Source: WTO data, IMF (April 2020 WEO database)

In the following graph we can see the increasing evolution throughout this century, we can observe a growth until 2008 where international trade falls due to the financial crisis of 2008, which had different factors that contributed to the deceleration of growth such as the substitution with domestic production in China of inputs that came from abroad. This negative impact of the financial crisis was followed by a rapid recovery. International trade reacts negatively to shocks and economic downturns much more aggressively than aggregate output.

The World Trade Organization has made two forecasts for developments in 2020 and 2021.

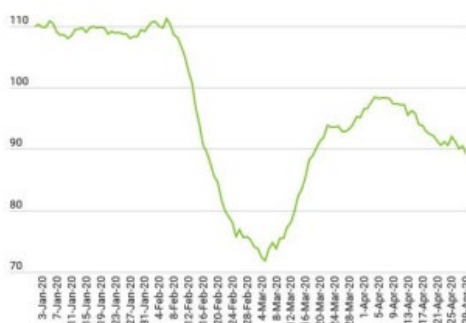
The optimistic scenario corresponds to a situation in which the pandemic will be under control in the coming months and the negative effects will be neutralized thanks to international cooperation and the implementation of effective economic policies. In this scenario, international trade would fall by approximately 12.9% in 2020, recovering to a positive rate of 21.3% in 2021

The pessimistic scenario considers a situation in which the pandemic has successive outbreaks and where international cooperation is inefficient so that there are no mechanisms to mitigate the spread of the virus. Under this scenario, the fall we would observe at the end of 2020 is 31.9% and the recovery for the following year would be partial.

The most affected export area for the Spanish territory is expected to be its relationship with North America, this impact is very different for different products or economic activities. The products that offer the best prospects given the situation are pharmaceuticals, as well as agricultural products and foodstuffs. On the other hand, the negative outlook is in the automotive and other manufacturing sectors.

The following graph shows China's estimated exports during the first months of the year, as a result of which exports fell by 35% during the first quarter of the year.

Chart 16 Estimated exports in the first months of 2020



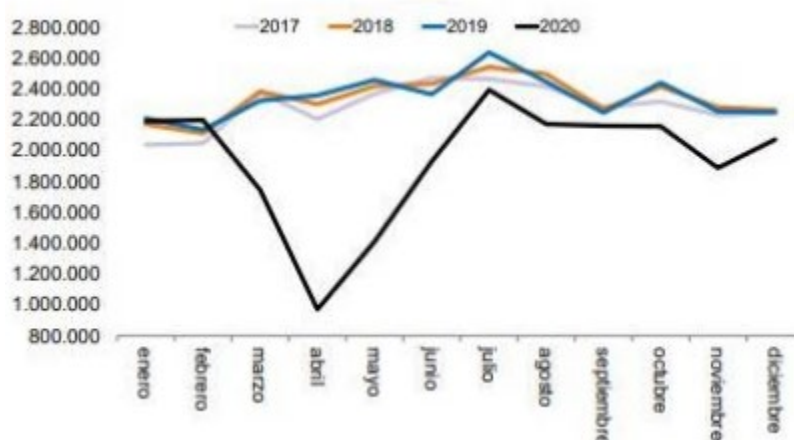
Source: Cerdeiro et al. (2020).

Global value chains have been affected due to measures taken by China in January involving the temporary suspension of exports of raw materials for industries such as electronics, pharmaceuticals, automotive and medical supplies, which forced activity to a standstill due to component shortages and the ineffectiveness of finding alternative suppliers. Starting in March, China gradually reopened its economy and export situation. The initial supply shock on trade gradually intensified with a demand shock, triggered by measures taken to minimize the rate of contagion worldwide. In the second quarter of 2020 the fall was close to 18.5%, so the contraction of world trade in 2020 would have been in line with some economists' forecasts of a 13% fall, these projections being based on the evolution of the pandemic. Trade in services has been severely affected, especially tourism, which accounted for 24% of world exports in 2019, has been particularly hard hit. During the first quarter of 2020, the number of international tourists worldwide decreased by 44% compared to the same period in 2019. Projections indicate a reduction of approximately 58% and 78% depending on developments and restrictive measures in the services sector. Some data to highlight on the variation of prices in some raw materials such as the price of oil marked historic lows during the month of April as a result of the barrel being quoted in negative value as a result of a reduction in global demand and a price war between some producers. The prices of minerals and metals have also suffered the consequences of a decrease in global demand causing a decrease of approximately 10% and 17%, their evolution depends on the reactivation of steel and metal production and construction in China.

In relation to agricultural and livestock products, the reduction in prices has been less

than the average for the rest of the world.

Chart 17 Evolution and time comparison of national demand for motor fuels



Source: CMMC

9. Conclusions

In this paper we go back to the beginning of the pandemic, with its initial data on the macroeconomic aspects and the sectors most affected. Once we have taken the starting point, we introduce the different fiscal, monetary and social policies imposed by the different national and international organizations with the sole aim of eradicating or controlling the pandemic as soon as possible.

In the macroeconomic aspect we start from a fall in the Spanish GDP of 5.2% in the first quarter of 2020, the social security suffered a fall of 900,000 people employed and a total of 3.4 million people in ERTE, and the unemployment benefit was requested by approximately 1.3 million people. These data show a surprising economic situation never seen before in the Spanish economy. The subsequent summer months saw quarterly growth of 17.1%.

The necessary cooperation between the Spanish government and the European Union was swift with a series of measures and policies to curb the spread of the pandemic in different political and economic spheres.

Government intervention focused on fiscal policies, injections of liquidity to the most disadvantaged sectors. An important factor that in other crises was a very hard-hit sector was the financial sector, in this case it was avoided because they had more reserves and money, thanks to this the banks compensated for customer defaults and interest rates decreased to meet the needs of households. These policies can be summarized in four different policies whose objectives were to reduce public debt in the long term and

to promote the growth of economic activity once the pandemic was under control.

As for the central bank, it acted in two blocks with two different objectives. The first one was aimed at improving the financing of companies that had obviously decreased their income and production and injecting liquidity during the first moment for companies to close down. The second block was aimed at long-term financing operations, on the one hand to make payments more flexible, and on the other to make countries' debts more flexible.

As for some indicators, recovery is expected to be long term, such as households losing their income, thousands of workers losing their jobs, education as students have had to adapt to new methods, the loss of mental health in a large proportion of individuals, and finally the increase in inequality caused by the sectors that have benefited.

The epidemiological-macroeconomic model study analysed the interaction and spill-over effects between the epidemiological aspects of Covid-19 and macroeconomic outcomes. For this study, the standard SIR epidemiological model was considered, i.e., characterizing the individual as infected, susceptible or recovered. This study has allowed us to simulate epidemiological and economic outcomes using Malaysian economic data in relation to different varieties of pandemic containment policies in which different infection and mortality outcomes are expected. It is a good model to answer the question "Health or economy? In some European countries the measures have not been as restrictive as in Spain, where the government, from the beginning of the pandemic, has been concerned about the health and safety of citizens in exchange for a deterioration of the Spanish economy, i.e. it has preferred a confinement and closure of the economy to mitigate the pandemic. All these policies have been expansionary fiscal policies by increasing public spending on subsidies and aid. We are now beginning to see the end, but the impact on some sectors is irrecoverable, as we have analysed in this paper, with the tertiary sector being the most affected.

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