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# Teaching the economic impact of COVID-19 with a simple short-run macro-model: simultaneous supply and demand shocks

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## Abstract

This short note has one main ambition. It seeks to provide students with a very simple macroeconomic framework to deal with the short-term economic impact of the COVID-19 pandemic. The explanation for the unprecedented magnitude of the recession over a short span of time is to be found in the peculiar form of the shock due to the various lockdowns. Indeed, the 2020 crisis is specific in that it involved two recessive shocks simultaneously: a demand shock superimposed on a supply shock. This model is original in that although it is driven by demand it is capable of dealing with supply issues without entailing any additional technical difficulties.

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**JEL codes:** A20, E12, E22

## 1. Introduction

It is well known that the 2007–2009 crisis left a considerable mark on our economies as the first deep recession of the twenty-first century. Nevertheless, the unprecedented negative consequences of COVID-19 in such a short span of time could ‘almost’ make us forget the subprime meltdown. For example, in a recent study forecasting the economic impacts of the current pandemic, Silvestre (2020) uses the expression ‘the mother of all recessions’ to emphasize the magnitude of the shock. In the same vein, IMF projections and the first estimates coming from various national statistical institutes show a dramatic collapse of GDP growth rates. Since the advent of the pandemic, a growing number of papers has emerged to explain the consequences of this supply shock on demand, its potential persistence through stagnation traps, or the optimal lockdown (e.g. Guerrieri *et al.* 2020; Fornaro and Wolf, 2020; Alvarez *et al.*, 2021).

At this stage, the main purpose of this note is to show, with the help of a short-run macro-model following the Kaleckian-structuralist tradition, in what way COVID-19 is unprecedented in terms of economic shock. To the best of our knowledge, it is the first time that this type of model has been mobilized to address the COVID-19 crisis for teaching purposes. We claim that the various forms of lockdown implemented to protect people from the Coronavirus disease involve two simultaneous shocks: one on the supply side of the economy, the other on the demand side. We believe this original aspect is the major reason GDPs have fallen so sharply. Moreover, as a secondary purpose, we show that although it is demand-driven such a model is able to deal with supply shocks without any additional complexity.

The paper proceeds as follows. Section 2 explains why economies have been hit by supply and demand shocks simultaneously and briefly presents some essential macroeconomic indicators for various countries in order to underline the exceptional gravity of the 2020 context. Section 3 presents our macro-model for a simple illustration of the double negative impact generated by the pandemic. Section 4 discusses some national and sectoral specificities which cannot be dealt with inside a simple model dedicated to teaching the economic implications of the COVID crisis. Lastly section 5 draws some conclusions.

## 2. The worst case scenario: supply and demand shocks at the same time

When wondering why the recession is so brutal we have to recall that the first effect of COVID-19 was the implementation of a strict lockdown by the Chinese authorities in various industrial cities in the province of Hubei at the end of January 2020. In March, similar measures were taken in other countries including Italy, Spain, Finland, France, Israel, Germany, the United States, the United Kingdom, India and several areas of the Russian Federation.

For a single country, this lockdown implies that some proportion of its employees is literally prevented from working, involving a substantial fall in output. This corresponds unambiguously to a negative supply shock and global domestic demand simply diminishes because the ability to spend on goods and services is constrained by the lockdown. If a supply shock refers traditionally to a modification of production conditions (productivity, costs), we face an administrative supply shock with the COVID crisis, since lots of shops and production sites are simply closed. It is to be noted that the nature of the supply shock may vary depending on the strictness of the lockdown. For example, in France, Italy and Spain, various businesses, qualified as non-essential, like restaurants were totally closed in March and April 2020 even preventing them from selling take-out food. In these cases, we face a pure supply-side shock. Nevertheless, in

countries where take-out orders or other activities are still allowed, there is room for demand effects. Some businesses like restaurants that maintain a certain level of activity (through take-out sales or even delivery services) may collapse because scared households prefer to cook at home. Here, we may face a demand-side shock following the supply-side shock.<sup>1</sup>

Another mechanism is also at work on the demand side exclusively. First, a recessive demand shock occurs simultaneously – in the form of a fall in exports – due to lockdowns implemented by other customer countries.<sup>2</sup> Here the collapse of external demand directly hits firms that are still in business, intensifying the global negative economic impact of the pandemic. Second, due to the beginning of the pandemic, animal spirits also play a major negative role from the demand side involving a drop in autonomous investment in many sectors of activity.

We believe the simultaneity of these recessive shocks is the main reason for the unprecedented recessions over a short span of time. Next we provide some evidence of the magnitude of the collapse and its double impact on the economy.

There are different methods for assessing the effects of COVID-19 in terms of activity. One possibility is to deal with the first estimates in terms of GDP for the first quarter of 2020 and compare them with the data for the entire year. Table 1 summarizes the growth rate of real GDP for various countries around the world and shows that a comparison could readily be made with the Great Depression.

**Table 1: Growth rates of real GDP (in %)**

	First estimates for Q1 2020	Data for 2020 <sup>f</sup>
United States <sup>a</sup>	-4.8	-3.4
Euro area <sup>b</sup>	-3.8	-7.2
China <sup>c</sup>	-9.8	2.3
France <sup>d</sup>	-5.8	-9.0
Germany	na	-5.4
Italy <sup>e</sup>	-4.7	-9.2
Spain <sup>b</sup>	-5.2	-11.1
United Kingdom	na	-10.0

Sources: <sup>a</sup>BEA (Bureau of Economic Analysis, April 29), <sup>b</sup>Eurostat (Statistical Office of the European Union, April 30), <sup>c</sup>NBS (National Bureau of Statistics of China, April 20), <sup>d</sup>INSEE (Institut National de la Statistique et des Etudes Economiques, April 30) and <sup>e</sup>ISTAT (Istituto Nazionale di Statistica, April 30). Growth rates over the previous quarter for the first column, data are seasonally adjusted.

<sup>f</sup>IMF, World Economic Outlook, January 2021 update. na: not available

Needless to say, the economic context is rather dramatic which is well reflected in the updated statistics of the International Monetary Fund (IMF) drawn up in January 2021.

<sup>1</sup> Using cellular phone data on customer visits, Goolsbee and Syverson (2021) show that the lockdown is not responsible in the United States for most of the decline in consumer traffic: 'Comparing consumer behavior over the crisis within the same commuting zones but across state and county boundaries with different policy regimes suggests that legal shutdown orders account for only a modest share of the massive changes to consumer behavior (and that tracking county-level policy conditions is significantly more accurate than using state-level policies alone). While overall consumer traffic fell by 60 percentage points, legal restrictions explain only 7 percentage points of this.'

<sup>2</sup> Obviously this second simultaneous impact does not concern China since it was the first country to implement lockdown measures.

These semi-definitive data remain consistent compared to the first estimates for the first quarter of 2020 that take into account no more than 15 days of lockdown for the vast majority of countries. Next, another useful indicator is the decrease in the rate of capacity utilization between January and April 2020. This indicator illustrates the enormous excess capacities in the economy as a consequence of lockdowns (Table 2).

**Table 2: Capacity utilization rate (%) at the beginning of 2020, total industry**

	January	April
United States <sup>a</sup>	76.7	60.1
Euro area <sup>b</sup>	80.8	68.3
China <sup>c</sup>	77.5	67.3
France <sup>b</sup>	82.5	66.9
Germany <sup>b</sup>	82.7	70.3
Italy <sup>b</sup>	76.8	na
Spain <sup>b</sup>	79.9	70.0
United Kingdom <sup>b</sup>	79.2	55.1

Sources: <sup>a</sup>Federal Reserve Bank of St. Louis, <sup>b</sup>Eurostat, <sup>c</sup>National Bureau of Statistics of China. na: not available

Lastly, regarding the demand shock acting through the channel of exports, the trade forecasts made by the World Trade Organization (2020) in October are particularly informative. World trade is expected to fall by 9.2% over the ongoing year as a consequence of the pandemic. This scenario would represent a crash comparable to the subprime crisis of 2008–2009. For example, North American and European exports could shrink by, respectively, 14.7% and 11.7% during 2020. These numbers emphasize that the contraction in external demand and, by extension, the existence of simultaneous supply and demand shocks is an unpleasant reality. Accordingly, we are convinced it is of prime importance to present such an event in the scope of a manageable short-run macro-model.

### 3. Illustrating the double impact of COVID-19 with a manageable model

We use a Kaleckian-structuralist short-run macro-model of growth and distribution to illustrate the effect of the pandemic. It is labelled 'structuralist' because it can be easily adapted to a variety of economic episodes. Such formal models were initially built by Rowthorn (1981) and Dutt (1984). Their flexible structure makes them particularly useful for analysing mature/industrial economies as well as developing economies. Since then, several extensions have been undertaken in the field of financial instability, wage bargaining with optimizing microfoundations or ecological economics (e.g. Taylor, 1985; Dutt, 1997; Chaiechi, 2012; Taylor *et al.* 2016; Nikolaidi and Stockhammer, 2017; Rezai *et al.* 2018). Moreover, despite this model being demand-driven, it allows us easily to take into account a supply shock such as the one following the pandemic. So, as a guideline, we follow Krugman's (2000) recommendation to use simple models in the specific case of practical applications.

We make the following assumptions. (a) The open economy produces a single commodity which can be both consumed/saved and invested. (b) Output requires two homogenous factors of production, labour and capital, and it relies on (c) a fixed coefficient production function. (d) Firms set their price assuming a fixed mark-up on

unit labour costs. (e) For simplicity, we ignore intermediate imports and fixed costs in the mark-up equation. (f) Firms may operate with excess capacity in order to respond immediately to an unexpected increase in demand. If some of these assumptions may be seen as overly simplistic to describe the various patterns followed by specific countries with very different institutional settings, we keep practical discussions on national dynamics for a final section.

The model is described by the following equations:

$$Y = C + I + G + (X - M) \quad (1)$$

$$C = c_{Y^d} Y^d \quad (2)$$

$$I = f_1(Y) \quad (3)$$

$$G = \bar{G} \quad (4)$$

$$X = \bar{X} \quad (5)$$

$$M = f_2(Y) \quad (6)$$

The first equation is simply the equilibrium condition between supply and demand on the market. Demand stems from consumption spending by households, investment spending by firms, public spending on consumption and investment, and the trade balance between exports and imports. Here, simple functions are assumed where consumption depends on households' gross disposable income ( $Y^d$ ) through a propensity to consume ( $c_{Y^d}$ ); investment depends on the level of output  $Y$  obeying an accelerator principle via the function  $f_1 > 0$ ; public spending and exports are held exogenous and imports are a positive function of national income.

Instead of these equations in levels, we prefer to present more dynamic formulations by dividing every equation by the capital stock ( $K$ ) as is usual in Kaleckian models:

$$c = C/K = c_{Y^d} \frac{Y^d}{Y} \frac{Y}{Y^{FC}} \frac{Y^{FC}}{K} = c_{Y^d} \sigma \frac{u}{v} \quad (7)$$

$$g = I/K = g_0 + g_u u \quad (8)$$

$$g_G = \bar{G}/K \quad (9)$$

$$x - m = (X - M)/K = x - m_u \frac{u}{v} \quad (10)$$

Here,  $\sigma = Y^d/Y$  is the share of households' gross disposable income in terms of GDP and we will discuss the impact of this parameter in the last section when dealing with economic policy analysis. Next,  $u = Y/Y^{FC}$  is the rate of capacity utilization with  $Y^{FC}$  the full-capacity level of output and  $v = K/Y^{FC}$  is the capital to full-capacity output ratio. For the investment function, we state that firms' investment depends on some base level  $g_0$ , representing the state of business confidence (or animal spirits), and on the rate of capacity utilization  $u$  reflecting, in some sense, the buoyancy of the market through a coefficient  $g_u > 0$ . Note that the value of  $g_0$  may well become negative as a result of deteriorated expectations about the future. This relationship can also be viewed as a standard accelerator function. Lastly, the net rate of accumulation is equal to gross accumulation minus the rate of depreciation of the capital stock:  $g^{net} = I/K - \delta$ . Equation (9) is government consumption and investment spending, divided by the capital stock. Equation (10) is the simplest way to deal with the trade balance in which exports,  $x = X/K$ , are exogenous and imports,  $m = M/K = m_u Y/K$ , depend on the domestic level of activity through a propensity to import  $0 < m_u < 1$ . After some simple algebraic manipulations we arrive at the right-hand side of expression (10). We do not enter into considerations concerning the exchange rate; this assumption is made for the sake of simplicity as we focus on a short-run horizon and the shock is generalized.

The model is solved easily while using a derived version of equation (1) where every variable is now divided by the capital stock:<sup>3</sup>

$$\frac{Y}{K} = \frac{C}{K} + \frac{I}{K} + \frac{G}{K} + \frac{(X-M)}{K} \quad (11)$$

Replacing the different sources of demand by their expression (equations 7–10) and solving for the index for the rate of capacity utilization ( $u$ ), we can rapidly arrive at the expression for the equilibrium rate of capacity utilization ( $u^*$ ):

$$u^* = \frac{(g_0 + g_G + x)v}{1 - c_{Y^d}\sigma + m_u - v g_u} \quad (12)$$

For realistic values of the parameters, the numerator and the denominator are positive and it is easy to compute fiscal and export multipliers. Animal spirits have a positive impact on the level of economic activity as does the accelerator coefficient. A decrease in the propensity to consume (a rise in the savings rate) or an increase in the propensity to import unambiguously reduces the utilization rate. Lastly, an increase in  $\sigma$ , the share of households' disposable income in GDP, has a positive impact on  $u^*$  since it is similar to a cut in taxes or an increase in transfers received. Everything else being equal, a rise in disposable income should push up consumption to which firms respond by increasing the rate of capacity utilization and investment. Nevertheless, below we show how such a rise may be completely cancelled by a fall in other variables such as the propensity to consume. The equilibrium value for  $g^*$  is obtained simply by plugging  $u^*$  into (8). The gross rate of accumulation can be written:

$$g^* = \frac{g_0(1 - c_{Y^d}\sigma + m_u - v g_u) + g_u(g_0 + g_G + x)v}{1 - c_{Y^d}\sigma + m_u - v g_u} \quad (13)$$

with the net rate being equal to  $(g^{net})^* = g^* - \delta$ .

After this overview of the market for goods and services, we have to complete the model while looking at the labour market. This part will be very succinct. We assume a fixed coefficients production function. This means that firms require both capital and labour to produce, with no factor substitution.

$$a_0 = L/Y \quad (14)$$

$$l = a_0 u/v \quad \text{with } l = L/K \quad (15)$$

Equation (14) is the fixed labour-output ratio, which is also the reverse of labour productivity. Equation (15) is derived from (14) and links the level of employment in terms of the capital stock to the rate of capacity utilization and  $v$ . In this simple model, the variations in employment thus directly follow the variations in utilization rates, and an increase in demand constrains firms to hire more workers.

Before turning to the COVID crisis, we can verify that this model produces the expected dynamics in the Post-Keynesian tradition. The model can be displayed in two diagrams as shown in Figure 1. In the upper part, we show the equilibrium on the goods market. To do so, we have to build a saving function. Saving ( $S$ ) is defined as the share of national income which is not consumed ( $S = Y - C$ ). In terms of capital stock, we can thus write:

$$g^s = \frac{S}{K} = (1 - c_{Y^d}\sigma) \frac{u}{v} \quad (16)$$

To be in equilibrium, the market needs the sum of private investment, public spending and external demand ( $g^d$ ) to absorb what is not consumed by households. If  $g^d > g^s$ , the market has surplus demand. If  $g^s > g^d$ , the market suffers from insufficient demand. The

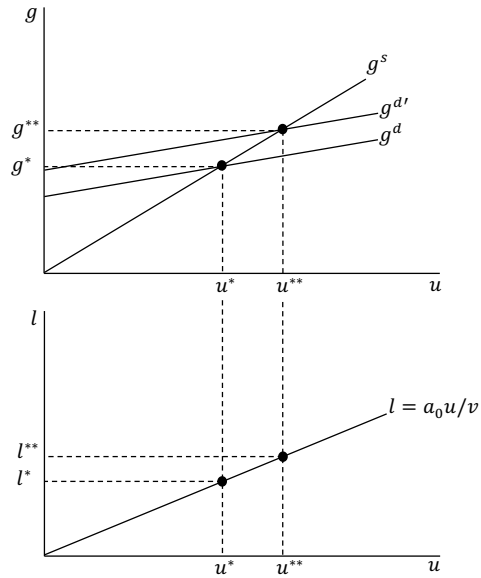
<sup>3</sup> The standard equilibrium condition in a static environment,  $Y = C + I + G + (X - M)$ , is now expressed in a more dynamic context, thanks to the expression of all variables in terms of capital. It makes full sense to divide investment by the capital stock since  $I/K$  gives the gross rate of capital accumulation, a variable that is essential in a Keynesian dynamic logic. For the other variables, it may seem a little odd, but we have to keep in mind that this effort is necessary to preserve the equilibrium condition.

equilibrium condition for the market of goods and services is thus that  $g^d = g^s$ , with the following expression for  $g^d$ :

$$g^d = \frac{l}{K} + \frac{C}{K} + \frac{(X-M)}{K} = g_0 + g_u u + g_G + x - m_u \frac{u}{v} \quad (17)$$

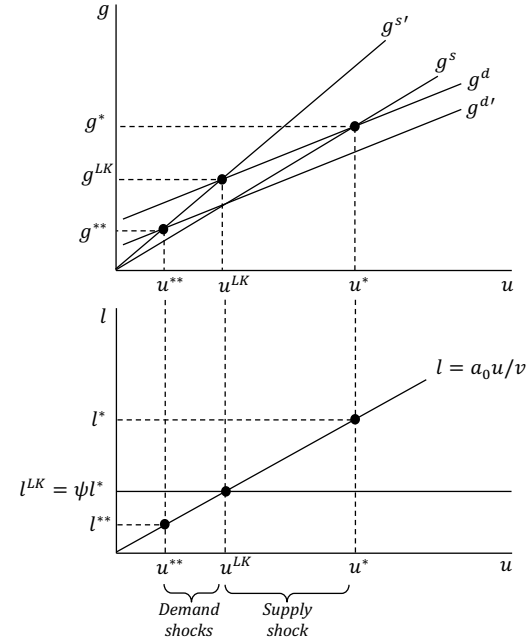
The equilibrium condition  $g^d = g^s$  is logically equivalent to the condition  $Y = C + I + G + (X - M)$ , but in a more dynamic framework. We can now draw the equilibrium in a  $(u, g)$  plan, with the equilibrium being reached when the two curves representing  $g^d$  and  $g^s$  cross. The lower part of Figure 1 gives the amount of employment deducted from the equilibrium rate of capacity utilization since  $l^* = a_0 u^*$ . As long as there are surplus capacities, supply adjusts to demand. For example, suppose the rates of capacity utilization and of accumulation are initially too low ( $u^*$ ;  $g^*$ ), entailing persistent unemployment (with low employment,  $l^*$ ). A standard reaction by governments would be to increase public spending, which shifts the  $g^d$  curve, containing aggregate demand components, upward and moves the economy closer to full employment: improving the situation on the market for goods and services ( $u^{**}$ ;  $g^{**}$ ) has a positive impact on the labour market, with an increase in employment ( $l^{**}$ ). Then, in the event of excess capacity, a positive shock on demand raises the level of activity and employment.

**Figure 1: A no-lockdown situation and an increase in public spending**



Now, turning back to the various impacts of COVID-19 we can easily use the above diagram to illustrate our main argument: it is the existence of simultaneous supply and demand shocks that engenders substantial economic turmoil.

**Figure 2: A lockdown situation following the pandemic – supply and demand shocks**



One of the first responses to the pandemic was to impose a lockdown on people, with the direct consequence of reducing the number of workers *effectively* available in various sectors and the level of output. This corresponds to an exogenous negative supply shock on the labour force: the supply of labour is reduced administratively by the lockdown. Consequently, it also leads to a negative supply shock on the markets for goods and services: production is reduced by political measures to fight the pandemic, with some activities forced to close. In our model, this first negative supply shock may be represented by the imposition of an exogenous constraint on the labour force. In the second part of Figure 2, this new level of employment is represented by the horizontal line  $l^{LK} = \psi l^*$  (the superscript  $LK$  refers to lockdown and  $\psi < 1$  is the percentage of workers still available during the lockdown) and corresponds to a lower rate of capacity utilization. We now have:  $u^{LK} = \psi l^{LK} / a_0$ . The adjustment towards the new equilibrium  $u^{LK}$  in the upper diagram stems from the saving function. In the specific lockdown case, the level of demand decreases because it is forced to adjust to the new supply conditions triggered by the shutdown of significant parts of the economy. Some households are obliged to save more, because they cannot consume as much as before (shopping, touristic and cultural activities, bars and restaurants are forced to close). In our model, this means that the propensity to consume ( $c_{y,d}$ ) falls (or the propensity to save rises). In this vein, Appendix 1 provides some empirical evidence illustrating the surge in the

household saving rate.<sup>4</sup> For example, the household saving rate increased by 133% in Spain within 3 months. For the U.K. and the U.S., the rise is respectively of 208% and 168%. These adjustments are unprecedented in economic history during peace time. Even for France, Germany and Italy, the increase is very significant. The fall in consumption and, by extension, in economic growth, may be largely explained by the scale of the rise in saving rates across countries. Therefore, the saving function ( $g^s$ ) rotates towards the vertical axis in the upper part of Figure 2 ( $g^s$ ). Since households cannot buy what workers under lockdown cannot produce, the utilization rate is reduced to  $u^{LK}$ .<sup>5</sup>

To this first supply shock, we must now add a demand shock. The crisis also leads to a reduction in demand for at least two reasons. A collapse of the state of business confidence  $g_0$  shifts the  $g^d$  curve downward. Firms may be depressed by the new environment, and they may decide to postpone or cancel investment projects. Nevertheless, the lockdown has a second simultaneous negative impact that makes itself felt through external demand. As already said, for an open economy, the lockdowns implemented in other countries involve a major contraction in the level of exports, shifting the  $g^d$  curve downward again. The accumulation of the two negative demand shocks (on investment and exports) may lead to a new equilibrium for the utilization rate at  $u^{**}$ , for a depressed growth rate of  $g^{**}$ . The downturn in the rates of utilization and accumulation<sup>6</sup> causes the labour-capital ratio to fall to  $l^{**}$ : the amount of employment is thus reduced below the level imposed by the lockdown. The external demand channel magnifies the internal recession because the lockdown concerns a lot of (major) economies around the world. The drop in investment completes the picture of a very depressed economic situation due to both demand and supply shocks.

During the lockdown, the increase in the propensity to save acts negatively in the short run. Reciprocally, the end of the lockdown may make this constrained saving disappear, thus leading to an increased capacity utilization rate. This vanishing of constrained saving for households might open the way to catching-up on consumption spending and to a strong recovery, with a return to the pre-crisis situation in the medium run. Nevertheless, this scenario is not necessarily the most plausible one. If the part of the increase in the propensity to save which is linked to the closure of shopping, cultural or touristic activities is relaxed once the lockdown has ended ( $\psi = 1$ ), we may fear a persistent increase in the propensity to save for precautionary motives. During the lockdown, some households spent less because they *could not* spend on usual activities. But, after the lockdown, we can imagine that some households may spend less because they fear the future (unemployment, new lockdowns, etc.). This *will* to save more may prevent the  $g^s$  curve from returning to its initial position, thus entailing a persistent loss of output and employment. Here, a voluntary and permanent increase in saving behaviours would replace a transitory constrained saving. In such a case, the economic

recovery, characterizing the post-lockdown situation, could be insufficient to get to the initial rate of capacity utilization  $u^*$ , remaining trapped below  $u^*$  and generating an output loss. We believe this scenario is extremely interesting because it emphasizes that demand may overreact to a supply shock leading us, through a different mechanism, to the conclusions reached by Guerrieri *et al.* (2020). To avoid these durable negative impacts of the COVID crisis, a permanent increase in demand may be necessary to counter this increase in the propensity to save.

#### 4. National and sectoral specificities

While we believe that our model is useful for teaching the main effects of the COVID crisis on supply and demand, it remains very simple and cannot sum up the variety of situations encountered around the world in a single scenario like the one suggested in Figure 2. So as to complement our analysis, we provide in this section some elements of discussions dealing with the main national and sectoral specificities regarding the pandemic. This section also contains some interpretations of the various political responses to the crisis, which may contribute to an understanding of the different scales in the depth of the recession.

First, we voluntarily assume a one sector economy which represents the main limitation of our model. The justification for doing so is pedagogical above all; indeed the Kaleckian construction described in section 3 remains intuitive for students and easily teachable. It is obvious that one of the manifestations of the pandemic is the variety of damage depending on the economic sector considered. In this vein, the French Economic Observatory indicates that the crisis has hit sectors but also countries very differently (see OFCE, 2020, p. 23). For example, the value added in the hotel and catering sector diminished by 80% in France and 50% in the U.S. while in agriculture it decreased by 10% in France and increased by 5% in the U.S.. A macroeconomic framework with only one sector is not intended to deal with such issues. Nevertheless, it was not our purpose to underline these sectoral shifts with this model, because we wanted to keep it as simple as possible so as to remain teachable.

This first remark leads us to another one. Since the pandemic has provoked various effects on the production of different sectors in the economy, the workers from these sectors have not been affected in the same way. In particular, many low-paid jobs have been lost because of the lockdown – putting these workers in a very difficult situation – while, at the other end of the wage distribution, high-paid jobs have often been allowed to continue on a teleworking basis.<sup>7</sup> The COVID crisis has generated profound inequalities among workers, and it is difficult to capture this reality in a macroeconomic model. For example, when we use the increase in propensity to save in the previous section, it is clear that some workers are not concerned by this kind of saving. Saving is very concentrated in the top of income distribution. But, at the macroeconomic scale, the changing behaviour of rich households may impact the global result more than poor

<sup>4</sup> Here, we consider an increase in the propensity to save only. If we had used a consumption function including an autonomous component, we could have modelled the increase in savings differently: not as an increase in the propensity to save out of disposable income, but as a decline in autonomous consumption. Nevertheless, it is difficult to measure empirically a change in autonomous consumption, while it is easier to have access to data on the propensities to save. Moreover, a consumption function with an autonomous component would have entailed undesirable complications to our reasoning.

<sup>5</sup> In a certain sense, we observe the Keynesian paradox of thrift: an increase in the propensity to save (here, constrained increase because of the lockdown) leads to a drop in national income, so that the amount of saving is not increased.

<sup>6</sup> Although the accumulation rate in Figure 2 is still positive, it must be remembered that it is the gross accumulation rate. When depreciation is removed the net accumulation rate becomes negative.

<sup>7</sup> In a *Washington Post* article (The COVID-19 recession is the most unequal in modern U.S. history) published on September 30, 2020, Heather Long and her co-author gather some striking facts on the unequal consequences of the crisis. For example, ‘the shift to remote work strongly favored more-educated workers, with as many as 6 in 10 college-educated employees working from home at the outset of the crisis, compared with about 1 in 7 who has only high school diplomas.’ Beyond the use of teleworking, inequalities also concern the rise in unemployment: ‘By the end of the summer, the downturn was largely over for the wealthy — white-collar jobs had mostly rebounded, along with home values and stock prices [...] Employment for low-wage workers was still down more than 20 percent in August from the summer before and around 10 percent for middle-wage workers.’

households' behaviour.<sup>8</sup> Of course, it could be useful to use a disaggregated model with different classes of households so as to take into account different propensities to consume, but it goes beyond the scope of this paper to do so. Again, we have sought to keep the model as simple as possible.

Another topic which is difficult to cover in a basic macro-model is the question of the various institutional structures. The impact of the crisis is not the same in different countries because they do not share the same Welfare States. For example, the automatic stabilizers are not as powerful in emerging countries as they may be in Europe.<sup>9</sup> In many developed economies the existence of unemployment benefits limits the fall in incomes. The presence of automatic stabilizers may be measured indirectly by the evolution of the share of households' disposable income in GDP ( $\sigma$ ).<sup>10</sup>

**Table 3: Share of households' gross disposable income in GDP**

	2019	2020
United States	78.82	84.27
France	62.92	67.62
Germany	62.55	64.66
Italy	66.52	69.07
Spain	61.42	68.16
United Kingdom	66.97	70.46

Source: AMECO database (European Commission), series UVGD for GDP at current prices and UVGH for households' gross disposable income.

However, the evolution of this parameter ( $\sigma$ ) also implies other factors. While Kaleckian authors usually build their models with an explicit reference to the profit share in value added, we choose here to take a different path, and we introduce this special parameter instead. Therefore, the changes in  $\sigma$  not only reflect the presence of automatic stabilizers, but they can also express changes in the profit share.<sup>11</sup> However, our choice to use this parameter for this paper is explained by our intention to keep the model as simple as possible. This parameter allows us to begin our model with a very simple equilibrium condition ( $Y = C + I + G + X - M$ ), while Kaleckians often present a saving function with different propensities to save on wages and profits. But, our choice to use this parameter is also linked to the capacity to produce statistics. While it is difficult to provide empirics for the propensity to save out of wages or profits, it is easier to have access to statistics on gross disposable income and its composition. A quick look

<sup>8</sup> For example, to study the immediate consequences of the *subprime* crisis, Wunder (2012, p. 183) stated that 'the consumption decisions of the top and second highest quintiles may account for much of what is happening in the economy today. Together these top two quintiles accounted for 70% of the GDP controlled by households. A small change in the propensity to consume of these quintiles may lead to dramatically large swings in aggregate demand.'

<sup>9</sup> For emerging countries with no real Welfare State, the shocks will thus be greater, especially for informal workers.

<sup>10</sup> The increase in  $\sigma$  may also be attributable to discretionary stimulus packages. Even though automatic stabilizers are more important in Europe than in the United States (Dolls *et al.*, 2012), the U.S. response to the pandemic has led to a strong increase in current transfers, notably thanks to lump-sum checks.

<sup>11</sup> Across countries, the differences in the levels of the  $\sigma$  parameter may stem from undistributed profits: theoretically, if we consider that households receive distributed profits (dividend and interest incomes), the complement to 1 for  $\sigma$  points to undistributed profits. Consequently, the higher levels of  $\sigma$  for the United States or the United Kingdom seem to come from higher dividend payout ratios.

at the empirical evidence helps to stress national discrepancies towards Welfare State scope and financing. The opposition between the French and U.S. models may be used to illustrate some critical points.

**Table 4: Composition of households' gross disposable income (%)**

	United States		France	
	2019	2020	2019	2020
Compensation of employees	67.70	63.91	82.84	78.08
+ Gross operating surplus and mixed income	23.48	22.53	20.75	19.57
+ Net property income	12.87	12.18	5.91	4.83
+ Current transfers received	18.68	23.07	42.16	46.29
– Current transfers paid	9.76	9.38	35.33	33.10
– Current taxes on income and wealth	12.97	12.31	16.33	15.67
= Gross disposable income	100.00	100.00	100.00	100.00

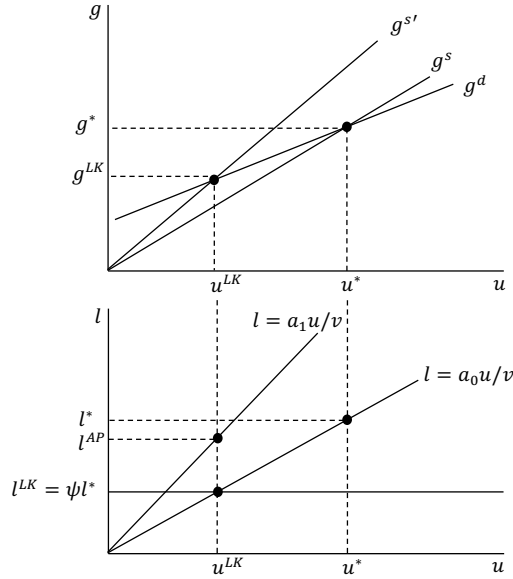
Source: AMECO database (European Commission), series UWCH, UOGH, UYNH, UCTRH, UCTPH, UTYH and UVGH by order of appearance in the first column.

Before the pandemic, the usual differences appear in Table 4: French households rely less on net property incomes than U.S. households, but income redistribution is more active, with current transfers and taxes representing a bigger part of their gross disposable income. With the pandemic, we observe the expected tendencies: employee compensation decreases everywhere, and current transfers received by households increase remarkably. Welfare States thus contribute to absorbing significant parts of the shocks undergone by households, so that the recession is tempered. In our model, the increase in the share of households' gross disposable income in GDP ( $\sigma$ ) can help offset the harmful effects caused by the decrease in the propensity to consume ( $c_{y,d}$ ):<sup>12</sup> although the ratio of consumption spending to disposable income drops, the ratio of consumption to GDP remains fairly stable because of political actions allowing for an increase in the ratio of disposable income to GDP. But, economic policies have not been the same everywhere. Again, the parallel between France and the United States may be useful. In France, public support for partial activity has been settled: under-lockdown workers are still in employment in spite of their inability to work, and they retain 84% of their net wages because of public subsidies to firms. In the United States, this kind of support has not been implemented, with the dire consequences of an unprecedented rise in unemployment, because of under-lockdown firms firing their workers. In our model, this opposition can be represented through the parameter linking employment to

<sup>12</sup> In our model, the compensation effect could lead to the absence of a clear increase in the slope of the saving function. But, here, we use annual data, and the rise in the propensity to save is very important during the months under lockdown, while the rise in current transfers may take some time.

activity ( $a_0$  in equation 14). This parameter is the reverse of labour productivity. The French path with partial activity has been to adjust to the crisis through a reduction in labour productivity,<sup>13</sup> while the American way is to absorb the collapse of production with a dramatic reduction in employment. For a given recession because of the lockdown and the increase in the propensity to save, the two countries would perform differently on the employment front.

Figure 3: Adjustment through productivity



If, for the sake of simplicity, we forget about the demand shocks and focus instead on the consequences of the supply shock caused by the lockdown, the pandemic entails a rotation of the saving curve in our model in the upper part of Figure 3, and an administrative reduction of workers available to work on the lower part of Figure 3: from a starting position of  $(u^*, g^*, l^*)$ , the economy moves to a depressed situation where utilization and growth rates are lowered  $(u^{LK}, g^{LK})$ . While the U.S. case may be represented by a strong decline in employment levels because of the absence of partial activity support ( $l^{LK}$ ), French economic policy leads to a drop in labour productivity ( $a_1 > a_0$ ), allowing for the limitation of damage on the employment front ( $l^{AP}$ ).<sup>14</sup> Neither

<sup>13</sup> Hourly productivity is roughly stable, but employment productivity is declining because of the fall in hours worked.

<sup>14</sup> While overall employment dropped by only 1.8% in France between 2019 and 2020, full-time equivalent employment fell by 10.5%. Partial activity managed to maintain workers in employment during the pandemic. But, the productive consequence is that employment productivity has declined by 5%, thus allowing for an increase from  $a_0$  to  $a_1$ . By contrast, the United States saw a surge in its unemployment rate from 3.7% to 7.9%, because of the absence of public support for partial activity, and

French nor U.S. workers are able to work because of administrative constraints imposed by the pandemic, but French workers are still in employment thanks to public support for partial activity. The French government decided to help firms to keep their workers, while the U.S. administration chose to let firms fire their workers. Consequently, the U.S. government has to increase the current transfers paid to households drastically (unemployment benefits, but also stimulus checks): the nominal increase in current transfers received by households between 2019 and 2020 has been 10.01% in France compared to 27.47% in the United States.<sup>15</sup>

If countries may perform differently with respect to employment for a given recession, the growth impacts of the pandemic may also be of various scales around the world. In our model, we have already alluded to the importance of considering the variations in the propensity to consume ( $c_{yd}$ ) and in the share of disposable income in GDP ( $\sigma$ ). But, other factors determine the depth of the recession. For example, the importance of administrative constraints is clearly correlated to economic downturns. The strictness in lockdown imposed by governments determines the fall in employment through the value of  $\psi$ . Here, a harder lockdown – i.e. a smaller  $\psi$  – implies a stronger fall in employment and a deeper recession. Such a parameter might be approached by utilizing the stringency index created by Hate *et al.* (2020) that records the strictness of lockdown policies primarily restricting people's behaviour like working, shopping, etc. Then, Appendix 2 illustrates that countries implementing stricter lockdown have poorer performances as measured by GDP growth rates. It is also via this parameter that we can represent the repetition of lockdowns, or that we can deal with the unequal vulnerabilities of countries to exposed sectors. For example, the countries specialized in touristic activities. But, these questions of international specialization also influence the scale of demand shocks. Touristic countries may suffer a bigger crash than countries oriented towards industrial production, because of the collapse in international holidays. In our model, the  $x$  parameter may encounter a sharp reduction, causing the  $g^d$  curve to move down in Figure 3, thereby deepening the recession.

Finally, one last aspect can explain national discrepancies concerning the toll paid to the pandemic: the importance of stimulus packages adopted by governments. In our model, the size of public support can be represented by the  $g_c$  parameter: an increase in public consumption and investment constitutes an increase in aggregate demand shifting the  $g^d$  curve upward, which may help to tame the recession. Here, early empirical evidence<sup>16</sup> is worth mentioning.

the destruction of jobs resulting from the pandemic (-6.26% between 2019 and 2020). These statistics also come from the Ameco database (authors' calculations from FETD and NETN series for respectively full-time equivalent employment and total economy employment, and UVGD series for nominal gross domestic product, and ZUTN for unemployment rates).

<sup>15</sup> While the United States chose to deal with the crisis with higher transfers to households, the French government decided to distribute higher transfers to firms, but neither solution creates growth in the very short run. The French path tries to preserve employment and sustain firms' survival through financial support in the medium run, while the U.S. path accepts a rise in unemployment, but opens the way to a consumption-led recovery thanks to stimulus checks.

<sup>16</sup> At the time of writing, these changes were still calculated with projections for 2020.



**Table 5: Nominal growth rates for the different components of GDP (2019–2020)**

	France	United States	United Kingdom	Italy	Germany	Spain
Private consumption	-7.22	-3.67	-12.02	-10.55	-6.30	-14.77
Public consumption	3.34	1.47	11.68	4.86	7.15	8.68
Collective consumption	6.38	na	5.56	4.86	6.70	8.23
Social transfer in kind	1.69	na	15.11	4.86	7.40	9.00
Total investment	-9.55	-3.83	-11.59	-13.76	-1.85	-18.03
Private investment	-11.00	-6.70	-13.97	-16.42	-3.48	-21.20
Public investment	-1.60	5.49	1.38	4.45	10.84	9.00
Exports	-19.52	-17.59	-11.65	-17.34	-10.07	-23.20
Imports	-14.34	-14.74	-15.69	-17.16	-9.21	-21.20
Nominal GDP	-6.77	-3.48	-5.99	-8.72	-3.13	-11.81

Source: AMECO database (European Commission). Nominal growth rates are calculated thanks to the series UCPHO, UCCGO, UCIGO, UIGT, UIGP, UIGG, UXGS, UMGs, UVGD (by order of appearance in the first column).

Through the European Commission predictions, the United States may be faced with a moderate recession. The reason may be a modest drop in private consumption and investment. Germany also seems to be suffering a relatively moderate slump. This time, the answer relies more on the strong public impetus, either in consumption (+7.15%) or investment (+10.84%) spending. On the contrary, Spain and Italy are expected to pay a high price to the pandemic, mainly due to the collapse in private consumption and investment spending. If Spain and Italy exhibit public support to fight the COVID crisis, France falls short in this respect: the rise in public consumption is only of 3.34% (compared to 4.86% in Italy, 8.68% in Spain, or even 11.68% in the United Kingdom), and public investment is even expected to fall.<sup>17</sup> So, fiscal impetuses are a key element in understanding the depth of national recessions.

## 5. Conclusion

This short note is an attempt to evaluate the immediate impact of COVID-19 using a simplified short-run macro-model. It is shown that the lockdowns imposed because of the pandemic generate two simultaneous negative shocks. The internal lockdown leads to a negative supply shock whereas the external lockdowns involve a negative demand shock through exports. We believe that the main explanation for the major recessions of 2020 is to be sought in the simultaneity of such shocks. National cases may diverge from one country to another for several reasons: on the one hand, the size of the supply shock depends on the scale and duration of the lockdown; on the other hand, the size of the demand shock may vary with the strength of the recession for trading partners. National performances may also diverge because of the existence of institutional discrepancies. Automatic stabilizers may help to soften the crisis, thanks to current transfers. The respective changes in saving propensities are crucially at stake when dealing with the economic slowdown caused by the pandemic. Even though the shocks are generated by constrained saving, and not necessarily desired saving, a derived version of the Keynesian paradox of thrift applies: the dramatic rise in (constrained) saving has been accompanied by a fall in income.

<sup>17</sup> The stimulus package announced by French government in September 2020 engages an effort in public investment, but only for 2021 onwards. French sub-performance is also linked to the country's specialization in touristic activities, the fall in which accounts for a substantial part in its drop in exports.

The impact of COVID-19 will also depend on economic policy responses to the present crisis. Although it is beyond the scope of our basic model, we believe future research in the spirit initiated by Baldwin and Weder di Mauro (2020) is needed in order to fully analyse government and central bank interventions in response to the current economic disaster. Finally, we hope our paper could help to teach the economic consequences of the Coronavirus disease. Even though a simple model cannot iron out every crease of reality, we believe our suggestions maintain a balanced path between simplicity and relevance making the model a suitable candidate for organizing a teachable discussion on the pandemic.

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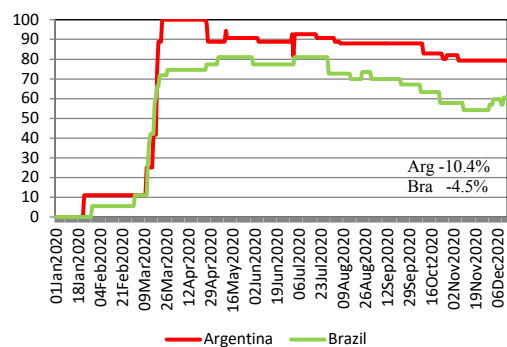
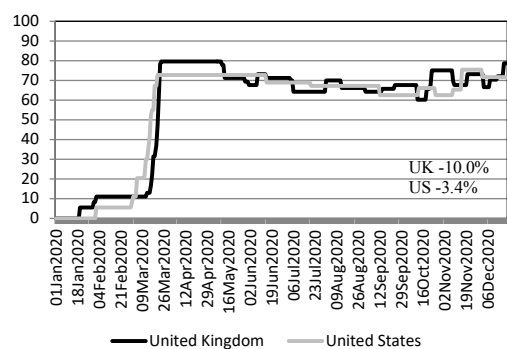
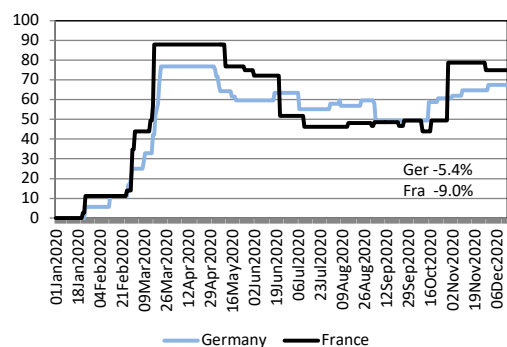
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#### Appendix 1: Gross saving rates for households (in % of gross disposable income)

	2019-Q4	2020-Q1	2020-Q2
United States <sup>a</sup>	7.3	9.6	25.8
Euro area <sup>b</sup>	12.4	16.6	24.6
France <sup>b</sup>	14.7	18.6	26.7
Germany <sup>b</sup>	18.6	19.8	28.0
Italy <sup>b</sup>	10.2	15.5	20.9
Spain <sup>b</sup>	6.2	10.4	24.3
United Kingdom <sup>b</sup>	7.3	9.1	28.1

Sources: <sup>a</sup>Federal Reserve Bank of St. Louis and <sup>b</sup>Eurostat.

## Appendix 2: Strictness of lockdown for various countries from Hale *et al.* (2020)



Sources: data available at <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker>. For growth rates at the bottom right of the figures see IMF, World Economic Outlook, January 2021 update.