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Covid-19 and Economic Analysis: a Review of the Debate

G. CARACCIOLO, F. CINGANO, V. ERCOLANI, G. FERRERO, F. HASSAN, A. PAPETTI AND P. TOMMASINO[1]

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[1] Banca d'Italia. The opinions expressed are personal and do not necessarily reflect those of the Bank of Italy.

1) Introduction

This newsletter aims at providing an overview of relevant, covid-19 related economic issues as discussed in the current literature. It therefore draws as much on traditional working papers as on (respected) online publications, blogs, etc.

This issue mostly focuses on research linking the evolution of the pandemic to macroeconomic outcomes, largely resorting to the intuitions provided by a very new set of quantitative micro-founded models, studying the joint dynamics of health-related and economic variables (so-called SIR macro model). We aim at highlighting the mechanisms leading to "V" of "U" like type of virus-induced recessions, vs those implying more persistent output losses (Section 2).

Within this class of models, it is also possible to frame crucial normative issues, with a view to understand what polices best address the vital trade-off between protecting health and preserving the economy (Section 3).

Finally, attention is devoted to works studying the role of macroeconomic policies and of the financial sector in contrasting the crisis (Section 4).

2) Understanding the economic consequences of Covid-19

While it is easy to misinterpret the spread of the infection first as linear (therefore underestimating its relevance) and then as exponential (so becoming excessively discouraged), epidemiologists know that, in absence of behavioral changes and policy interventions, all epidemics follows a standard "epidemiological curve": it rises rapidly, peaks, and then declines (). In order not to overburden the health system and to protect the more vulnerable citizens, serious containment measures are unavoidable. If correctly implemented, they will flatten the "epi curve", buying precious time while waiting for a vaccine or effective cures.

In the meanwhile, our economies will have to go through a large contraction in activity (IGM Economic Experts Panel, 2020). Such contraction arises for five main reasons:

(i) **Direct loss** in labor supply due to deaths and infections with associated **medical costs**;
(ii) Further losses in labor supply due to **Government non-pharmaceutical interventions** such as lockdown and social distancing;
(iii) **Declines in Households' consumption propensity and Firms' propensity to invest** due to the lockdown and increase in uncertainty;
(iv) **Global interactions** in terms of disruption of trade and global value chains;
(v) **Possible hysteresis effects** preventing a return to the pre-crisis economic equilibrium.

The multifaceted nature of the shock implies that its ultimate impact on the economic system is very difficult to predict.

For example, points (i) to (iv) suggest "a race between supply and demand" (Galeotti and Surico, 2020) which would be very harmful in the short-term but that can end in a "V" or "U" shaped recovery. Conversely, point (v) sets forth the idea that the context of secular stagnation and liquidity trap might imply that the Covid-19 shock ends up triggering "stagnation traps induced by pessimistic animal spirits" (Fornaro and Wolf, 2020) which can lead to a "L" like non-recovery especially for businesses in the services sector (Baldwin and Weder di Mauro, 2020). Guerrieri et al. (2020) formalize the intuition by Rowe (2020) that a 50% shock that hits all sectors is not the same as a 100% shock that hits half the economy (what the Covid-19 policies actually do). In essence, if goods are not too close substitutes, individuals save today in order to buy goods later in time from those industries that are currently shut down. Aggregate demand contracts more than the initial supply shock ("Keynesian supply shock") causing a sharper recession which, however remains V-shaped.

This notwithstanding, a growing literature tries to shed light on the economic impact of the Covid-19 crisis using a variety of modelling techniques. The roadmap to this brief overview of such models is to first present the workhorse epidemiological model, the so-called SIR model. Then, to see some extensions allowing to study the interactions between individuals' economic actions and the spread of the virus. This type of epidemiological-macroeconomic models with lockdown measures tend to predict for 2020 a recession 3 times larger than what would prevail in a purely *laissez-faire* equilibrium, where this *laissez-faire* equilibrium has a

fall of real GDP in the range 5-7% for 2020. Full-fledged SIR-Macro models do not consider interdependencies across countries, e.g. global value chains disruptions, that instead are discussed in some more standard contributions based on multi-country DSGE models. At the end of this section, a brief summary is presented of works stressing the potentially large long-run economic costs associated to the Covid-19.

The long-established Susceptible-Infected-Recovered (SIR) model[2] has been the framework mostly used by health experts to evaluate the spread of Covid-19. The key parameter is the "basic reproduction number" (mostly referred to as R0), i.e. the expected number of new infections from a single infection, net of the recovery rate. If R0 is greater than one, a given initial proportion of infected in the population is doomed to lead to an epidemic outbreak which, however, in the model always dies out at a certain point in the future. While in theory this can justify a no-action strategy that leads to "herd immunity", in practice, this would have devastating costs in terms of human lives (Regalado, 2020) so that most recommendations point to rather "flattening" the epidemiological and recession curves (Gourinchas, 2020) by reducing R0 *in fieri* via containment measures (Stock, 2020).[3]

Economists are becoming acquainted with SIR models. Atkeson (2020) and Stock (2020) calibrate a standard SIR model for the United States and argue on the potential economic costs based on different hypothesis about the evolution of the virus. Casares and Kahn (2020) do a similar exercise for Spain. Favero (2020) employs an online tool[4] to have similar scenarios for Lombardy.[5]

Eichenbaum et al (2020) is one of the first examples to combine epidemiological and macroeconomic model. Such **SIR-macro model** predicts a sharper recession and fewer deaths than a simpler model without the feedback effects going from the economy to disease diffusion. The main reason is that susceptible people severely reduce their consumption and hours worked to lower their probability of being infected (even if they do not fully internalize the impact of their action on the aggregate infection rate). Assuming no containment policies (*laissez-faire* equilibrium), the estimated average **fall in** real aggregate total **consumption** in the first year of the epidemic is roughly **seven times larger than in the model** without feedback effects (4.7% versus 0.7%, in the US case). Kaplan, Moll and Violante (2020)[6] present results of a similar order of magnitude for a *laissez-faire* equilibrium in a more complex SIR-macro model with heterogeneous characteristics across occupations. The **most hit occupations** are those with relatively low flexibility in terms of substitutability with remote work and higher social contact intensity, which tend to be **associated with relatively poorer individuals** (in terms of both wage and liquid wealth). Glover et al. (2020) note that the benefits of slower viral transmission accrue disproportionately to older households and that the costs of reduced economic activity are disproportionately born by younger households who bear the brunt of lower employment in non-essential industries. Hence, they develop a SIR-macro model with heterogeneity by age to study the optimal policy.

All the analyses quoted above are studies for closed economies. On the contrary, Fernando and McKibbin (2020) study a multi-country multi-sector DSGE model where **interdependencies across countries** manifest through linkages in production inputs, final goods trade and financial flows.[7] The Covid-19 shock induces a negative labor supply shock, disruption of production networks, shift of consumption preferences towards domestic goods, and a rise in equity and country risk premia. According to three pandemic scenarios the contagion (mortality) rates range from 10% (0.2%) to 30% (0.9%), being in the same ballpark of the available epidemiological data associated to the major pandemics of the 20th century. In particular, these scenarios assume that the epidemiological shocks are transitory and occur in all countries to different degrees. The range of the **output loss** generated by the widespread of the virus goes from roughly **2.5 to 9 percentage points in 2020 for Italy**, US and Germany. All these scenarios are characterized by a V shape recovery.

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[2] Anderson and May (1991) provide an overview of the developed literature on SIR models since then.

[3] Stock (2020) notes that for the Covid-19 little is known about R0 because "testing has been limited and the testing that has been done has largely been targeted to the sick, especially the sick who are either the most vulnerable or who might benefit the most from hospitalization. That is, testing has largely been of the symptomatic".

[4] "Epidemic Calculator" available online: https://gabgoh.github.io/COVID/index.html

[5] As noted by Baldwin (2020), the only epidemiological study to date on Western Covid-19 outbreaks with estimates of SIR model parameters is done on data for Lombardy by Cereda el al. (2020) who estimate the R0 at 3.1 (95% CI, 2.9 to 3.2) with a decreasing trend starting around February 20, 2020.

[6] Conference presentation at https://sites.google.com/view/virtualmacro/

[7] Contrary to the SIR-macro models, the process of contagion is not explicitly modelled, hence there are not feedback effects from economics to the virus diffusion.

The negative effects on global supply chains could go beyond the short-term period. Baldwin and Freeman (2020) suggest that while China is now gearing back up to pre-crisis production levels, the other two most important countries in the manufacturing sector, Germany and US – which are now severely hit by the virus – can in turn impair supply chains worldwide.

So far, the presented models concentrate on channels that would deliver deep but relatively shorter recessions, giving them either V or U-shapes. Fornaro and Wolf (2020) **instead**, using a New-Keynesian framework warn that the recent Covid outbreak could give rise to an **expectation-driven stagnation trap**. Because of the virus, agents forecast a lower productivity growth so that they start to consume less. Employment falls and firms react by cutting investment that negatively influences productivity, which, in turn, allow the initial expectations to materialize. This supply-demand doom loop would be particularly harsh during periods when monetary policy is constrained by the zero lower bound in which case **agents might coordinate in an equilibrium where output remains permanently low featuring as a "L" non-recovery**. Jordà et al. (2020) support empirically this view. By analyzing the 12 major European pandemic episodes since the 14th century, they find that the natural real interest rate (generally associated with prospective growth) declines for decades thereafter, reaching its nadir about 20 years later, with the natural rate about 2% lower had the pandemic not taken place. This decline would be reabsorbed only after 40 years.[8] The stagnation trap could be avoided by fiscal policies in the form of subsidy to firms' investment or public investment programs.

Uncertainty is the Stone Guest nowadays. First, the **diffusion of the virus is still uncertain** around the world: it seems to be exhausted in China but far from the peak in countries like US or UK. Second, **the range of expected economic losses** across major development countries is **wide**. For example, Dietrich et. al (2020), using a survey of US households interviewed on March the 20th, show that the average expected 12-month output loss amounted to 6.8%, surrounded by a high level of uncertainty with answers spanning from 1 to -15%. Furthermore, the VIX index has recently reached historically high levels and the US stock prices index is at the most volatile month ever. Third, as above said, the length of the incoming recession is another unknown element and can differ across countries. All in all, uncertainty is likely to play a central economic role especially during the post-emergency phase when firms have to set their new investment plans and consumers will regain the possibility to spend freely.

3) Normative policy analysis: optimizing the health-output trade-off

In a simple SIR model without macroeconomic interactions but that enables to evaluate the impact on output, Alvarez et al. (2020) find that conditional on no cure for the disease, the **optimal policy** prescribes a total economic lockdown for about 5 weeks. The relaxation of the lockdown policy is gradual: after 1 year, half of the economic activity is still in a lockdown. The intensity of the lockdown depends critically on the gradient of the fatality rate as a function of the infected.

Berger et al. (2020) extend the canonical SIR model to show that the total deaths occurring under a quarantine-only policy can be achieved under looser quarantine measures and a substantial increase in random testing of asymptomatic individuals, thus mitigating the downward impact on economic activity as measured by the fraction of individuals out of quarantine.

Coming back to frameworks with macroeconomic interactions, Eichenbaum et al (2020) find that absent a vaccine or treatment the optimal policy[9] is to gradually ramp-up containment measures to reach a critical level of immunity and avoid a recurrence of the epidemic. The optimal policy in the "complete SIR-macro model" (which includes the possibility of a vaccine discovery, effective treatment as well as the potential increase in mortality associated with hospitalization scarcity) dictates a **policy mix with an immediate severe containment measure** followed by a ramp-up of containment policies that accelerates at the pace of infection and then slowly fades away accordingly. With such containment, **the recession is more severe than in the *laissez-faire* equilibrium** (average real aggregate total consumption in the first year of the epidemic is 22%

[8] Historical episodes of war have instead a persistent upward pressure on the natural real interest rate.

[9] The optimal policy maximizes a weighted average of the lifetime utility of the different agents (susceptible, infected and recovered) which requires the assumption of an economic value of life. In the baseline Eichenbaum et al. (2020) assume that the value of a life is 9.3 million 2019 dollars in the pre-epidemic steady state. This value is claimed to be consistent with what U.S. government agencies normally use in their decisions.

versus 7%). The **benefit of a large recession is a less severe epidemic**: the peak infection rate drops from 4.7% to 2.5%, the death toll drops from 0.4% to 0.26% both as percent of the initial population. For the U.S., this reduction amounts to about half-a-million lives.

The SIR-macro model developed by Glover et al. (2020) allows to study optimal policy in terms of what fraction of the non-essential' sector to shut down (mitigation policy) and how much to redistribute (at a cost) from workers to non-workers (old, infected and people in shut-down industries). The more a planner priorities the elderly the stronger the mitigation; the higher the redistribution cost the more moderate the mitigation.

Finally, focusing on the empirics of the 1918 Flu Pandemic Correia et al (2020) caution about studying the health-output trade-off as the cost of **no government action** (which presumably minimizes the short-run fall in economic activity) **might have long-lasting effects** that theoretical models might not capture. They find that more affected areas remain depressed relative to less exposed areas from 1919 through 1923. At the same time they find that cities that implemented non-pharmaceutical interventions earlier and more aggressively experienced a relative increase in real economic activity after the pandemic.[10][11]

4) Going granular: policy levers to mitigate the economic fallout

As we discussed in the previous Sections, the nature of the COVID-19 shock is such that its effects are likely to be persistent if not countered by bold macroeconomic policies supporting both supply and demand.

In what follows, we will review how fiscal, monetary as well as credit policies might be useful to support the economy in the current juncture.

4.1) The role of fiscal policies

Several recent research works justify the use of fiscal policy in the current context by singling-out the channels through which the COVID-19 shock hits the economy. Faria-e-Castro (2020) characterizes the pandemic as a **negative shock to the propensity to consume** "contact-intensive" services. This initial negative shock is further amplified by general equilibrium forces (higher labor costs, more binding borrowing constraints, increase in NP loans) and the **presence of a ZLB**. The result is a sharp increase in unemployment. In such circumstances, **fiscal measures are particularly effective**. Government purchases have the highest impact in the aggregate, While less effective in terms of fiscal multipliers, unemployment insurance transfers are to be preferred from a distributive viewpoint, as they have benefit the most vulnerable households (i.e. those cash-constrained).

In the above-mentioned model by Luca Fornaro and Martin Wolf (2020) there are **complementarities between aggregate demand and aggregate supply**. High expected growth in the future induces more consumption and employment now, due to inter-temporally optimizing households; more consumption and employment today induce more firm investment and therefore more growth. In this economy, the coronavirus shock might reduce aggregate supply to such an extent that **multiple equilibria become possible**. In particular, there appears a stagnation equilibrium with low growth and low consumption and employment. To **avoid** such **stagnation trap** there is little that conventional monetary policy can do, but **fiscal policy** – most notably, productive public investment – **can be of help**.

Admittedly, **less work has been done at a more detailed level**, i.e. on determining what are the specific policy levers that should be primarily activated (a similar point can of course be made for the mix of monetary policy instruments activated).

Guarantees vs transfers. As the shock is deemed to be temporary, its main – or at least first round – adverse effects should play though (the lack of) liquidity in the economy. Therefore, some economists suggest that the **main role for fiscal policy is to provide guarantees rather than outright transfers (**Gopinath 2020, Budish et al. 2020). In short, the advantage of guarantees is that they address liquidity problems with a relatively small cost for the budget; they are of course less effective if damage to household incomes and firm profits turns out

[10] This is consistent with results in Eichenbaum et al. (2020) where in the long-run the level of total output is lowered due to the incurred deaths while per-capita output is the same.
[11] See also Barro et al. (2020), and Baldwin and Weder di Mauro (2020).

to be long-lasting. To address the latter case (help firms whose profitability is permanently reduces), Drechsel and Kalemili-Ozcan (2020) suggest an immediate negative lump-sum tax for US SMEs proportional to previous years' payrolls. These resources could and should be channeled toward firms with virtually no paperwork required, with only some strings attached (e.g. firms could be required to hold on to their employees).

Some kind of **transfers look particularly apt to the current situation**. This would be the case of more generous **unemployment benefits** (both in terms of replacement rates and of eligibility): given the lockdown and containment measures currently in place, stronger unemployment benefits are not subject to the typical criticism of discouraging labor supply. They would actually contribute to align individuals' incentives with the public health objectives, as they would discourage workers to go around searching for job (Dupor, 2020).

Taking control of firms altogether? On the supply side of the economy, whole supply chains as well as entrepreneurs-workers-consumers networks may suffer from the disappearance of small and medium enterprises (SME), those lacking the liquidity or capacity to absorb the shock. The deterioration of such linkages may entail large costs for the economy, despite the temporary nature of the shock. Saez and Zucman (2020) stress the **role of the government as "payer of last resort"**, intervening directly in the management of businesses by paying the salaries of idle workers and financing the necessary bills as rent, utilities and maintenance costs. These authors do not consider providing liquidity is sufficient, as this would not compensate firms for their permanent losses.

Some economists argue that for some firms the government should consider, instead of providing guarantees or loans, to become a shareholder. For example, Lonergan and Blyth (2020) lay out a government support package aimed at saving UK airlines from bankruptcy that consists of a mix of zero-interest loans refinancing, new credit facilities and a 30% **equity purchase** of the major airlines capital. The financial support comes with the condition to maintain all current employees, regardless of their contract type.

Another issue is whether one should try to **target the beneficiaries or provide public assistance across the board**. On one hand, households differ in their ability to smooth consumption; firms differ (for structural as well idiosyncratic reasons) in their liquidity needs; among the different classes of workers, the self-employed seem to be the most vulnerable and are typically not covered by the existing safely net (Pissarides, 2020).

On the other hand, information and institutional costs may limit the ability of fiscal policy to identify the most deserving subjects or sectors, and at the current juncture promptness of any possible intervention appears to be a fundamental ingredient. Some economists (Cowen, 2020; Mankiw, 2020) urge the government to immediately send a check of the same amount to every citizen (for the US, they suggest a $1000 amount).

Fiscal policies and pandemics in a currency union. In the Euro area, the current crisis also has reignited the criticisms of the *current institutional framework* and its ability to meet its demands.

The need of timely and adequate policy responses calls into question what are the *actual roles* of the ECB (inflation stabilization vs. lender of last resort), of the EU (autonomous fiscal policy vs. solidarity) and of the governments (support aggregate demand vs. social insurance). As of now, the central bank has taken center stage.

In this context, a debate that had occupied many pages in the blogosphere and publications already in 2019 has regained wide visibility: **what can monetary policy do -** once all his conventional and less conventional instruments[12] have been deployed – **to stimulate the economy?** Have the *regulatory, political and economic constraints* faced by the ECB become binding? In any case, given the extraordinary nature of the current shock, it becomes paramount to assess whether the **other existing policy tools *at the euro area level*** will be **appropriate and effective**, **or *new instruments* should be created** to address the challenges.

As it is well known, in the Euro area fiscal policies are decentralized and some high-debt countries currently have less fiscal room for maneuver than others. Besides preventing an appropriate fiscal response, high public indebtedness – together with the coronavirus shock – might trigger a financial crisis that ultimately damages the all Euro area and, in an extreme scenario, puts its very survival into question.

[12] The ELB of the longer end of the yield curve may be lower than the one of the shorter end, as there is also the term premia component. However, there is a limit below which unintended consequences on profitability of financial institutions may have disruptive effects and reduce expansionary effects of low interest rates.

Therefore, within the scope of fiscal policy, **almost all economists argue in favor of a supranational** (not merely coordinated) **EZ response to the crisis** (see e.g. the voxeu e-books no. one and no. two), even if some governments appear to disagree. This reluctance to act together can be ultimately traced back to (i) in the short run, a larger fiscal space available and (ii) in the long run, the unwillingness to relinquish to supranational authorities further elements of national sovereignty (especially as such sovereignty has to be shared with other less fiscally disciplined partners).

Of course the implementation of a European common fiscal response is not only difficult due to political resistance, but also because the technical **way in which such response should be implemented** is far from obvious.

Some economists think that EA countries should **resort to an ESM credit line** (Blanchard, 2020, Bénassy-Quéré et al. 2020). In this case no new resources would be needed (the ESM has already unused funding capacity). The disadvantage would be related to the stigma attached to a help request to the ESM and to the fact that this help would in any case increase the debt of the helped country.

Other think that **full-fledged Eurobonds** are needed (e.g. the already-mentioned Gourinchas, 2020, or Giavazzi and Tabellini, 2020). With the issuance of an EB backed by the EU (possibly together with guarantees by member states) the above problems would be partly addressed. Sandbu (2020) suggests that the revenues from Eurobond issuances should be transferred to the countries participating to the scheme in proportion to the fraction of GDP lost and to the crisis-related increase in public deficit. Landais et al. (2020) endorse Eurobonds and argue that, in order to service and repay the common debt, a European-wide progressive net wealth tax should be levied on the top 1% richest individuals.

Finally, some would go for national deficit-spending directly financed by the ECB, the so-called **"Helicopter money"**. The central bank creates and transfers money to the government, which would be equivalent to a commensurate purchase of government debt by the central bank followed by its immediate writing-off, thus no longer having an impact on the government's effective debt liabilities.[13] The survey attached to this newsletter reviews the main characteristics of helicopter-drops type policies, summarizes the debate on such policies as it has developed in the last two weeks of March, and provides an operational description of how helicopter money policies could be implemented through the lenses of the balance sheets of the Government and the Central bank.

4.2) The role of banks

Banks can be a key player for the resolution to the crisis in various ways.

Banks as a vehicle for public policy. – Banks can become a vehicle for public policy, as they can accelerate policy implementation and offer a timelier response to the crisis. An example of this type of contribution is the **agreement between the Italian Banking Association** (ABI) **and trade unions** (CGIL, CISL, UIL etc.), where banks will anticipate 1,400 euro to workers that are entitled to the wage supplementation scheme (CIG).[14]

In the US the Internal Revenue Service will credit financial aid to workers directly to their bank accounts, based on their tax return in 2019 (without workers having to fill any form). A similar approach is taken in Germany. In this case banks are not anticipating liquidity, but serve as disbursement vehicle.

Banks as liquidity insurers. – The credit lines that banks had already agreed with firms before the Covid-19 crisis represent a crucial liquidity buffer for the non-financial sector. Acharya and Steffen (2020) stress that, at the end of 2019, in the US the amount of outstanding bank credit was about 958 USD billion and that the outstanding amount of ***undrawn*** **credit lines represents, on average, 81% of total** committed credit lines. Most of this undrawn credit is related to the manufacturing sector (54%) and then services (20%). These estimates are **currently being reviewed for Italy by the Covid-19 team**. It is crucial to preserve this buffer.

[13] From an accounting viewpoint, this would be captured by a reduction in the central bank's capital or by a permanent annotation on the asset side of its balance sheet. By itself, it should therefore have no impact on the central bank's profits (which are periodically transferred to the government) especially if the interest rate on reserves were to remain at zero.
[14] The details of the agreement can be found here

Banks as lenders for saving jobs. – Mario Draghi in his FT editorial advocates that "*banks must **rapidly lend funds at zero cost to companies prepared to save jobs**. […] and the capital they need to perform this task must be provided by the government in the form of state guarantees*". To ensure that this is the case, most governments have already took action in various forms. However, an important difference across countries is how much emphasis has been put on guarantees for a moratorium on existing loans (as in Italy) *vis-à-vis* the issuance of new loans or debt instruments for firms (as in Germany). There are several open issues concerning this last point.

- **Should private banks disburse loans to firms?** Brunnermeier et al. (2020) argue that there should be a **European funding scheme** that involve the European Investment Bank (EIB), which should **offer loans to all firms** solely for the purpose of **covering payments due in the semester** at a 0% interest rates. Firms can then pay back these loans over a period of 6-8 years and the recovery of their instalments should be entrusted to the national tax authority as an add-on to the tax liabilities. The EIB could fund these loans by placing bonds with the ECB which provide liquidity. The main advantages of such scheme, relative to channel loans via national private banks, are that i) this scheme will reduce non-performing loans and help stabilise banks; and ii) the money will flow directly to firms in all the EU member states, irrespective of the health and efficiency of national banking systems.
- **Are loans the right financial instrument to support firms?** Pagano (2020) argues that supporting firms through new loans will weaken the financial structure of firms, which will turn to be highly indebted when the recovery will start. Hence, he stresses that **firms should be financed through equity** thanks to **recapitalization coming from public funds**. However, given that the fiscal capacity for doing that is very asymmetric across European states, whereas this is a common shock, he advocates for the creation of a pan-European equity fund managed by the EIB. In this respect, the stabilization fund that Germany has put in place (WSF) secures 100 euro billion that can be used to recapitalize firms (whereas 400 euro billion of guarantees can be used to finance new loans and bonds).

4.3) The role of monetary policy

In the last weeks, there has been an intense debate on what monetary policy can do in response to a shock such as the Covid-19 one, which is affecting the global economy in an environment already characterised by historically low interest rates. **Two responses emerged from the debate: we will call them the orthodox and the heterodox view**.[15]

The orthodox view. According to the orthodox response central banks should immediately intervene (and, in fact, they did) by dusting off (and in some cases extending both qualitatively and quantitatively) the armamentarium developed during the global financial crisis and the sovereign debt crisis[16]. This includes liquidity provision measures targeted to specific markets in order to preserve the correct functioning of the monetary policy transmission mechanism (T-LTROs, Commercial Paper purchase programmes, Money Market Mutual Fund Liquidity Facility, currency swap programmes, etc)[17] and measures aimed at providing

[15] In what follows, we mainly focus on the latter, since it includes measures that are currently only discussed and have not been taken anywhere yet.

[16] For the US Cecchetti and Schoenholtz (2020): "*Over the past two weeks, the Federal Reserve has resurrected many of the policy tools that took many months to develop during the Great Financial Crisis of 2007-09 and several years to refine during the post-crisis recovery. The Fed was then learning through trial and error how to serve as an effective lender of last resort (see Tucker) and how to deploy the "new monetary policy tools" that are now part of central banks' standard weaponry*." For the euro area see for example Eurointelligence (2020), "*There is not much else the ECB can do qualitatively. It can expand the asset classes it buys through its new pandemic emergency purchase programme, […] Quantitatively, the ECB can expand the size of its existing programmes such as the new PEPP. It may also find that the health crisis lasts beyond June, in which case heightened uncertainty for banks will also persist and the ECB will be forced to consider renewing its emergency series of weekly LTROs for another quarter, until the TLTRO III auction in September*."

[17] See for example the document released by the Systemic Risk Council, "SRC Statement on Financial System Actions for Covid-19".

the expansionary impulse of monetary policy (reduction of policy rates, forward guidance and asset purchase programmes)[18].

The heterodox view. More "heterodox" proposals have re-emerged (helicopter drops, MMT, MP3, SEFF, etc.)[19]. These proposals differ for important *institutional aspects*, but they start from the same *premises* and reach similar *general conclusions*. The two premises are the following: first, in response to the Covid-19 shock the effectiveness of monetary policy measures that rely on the interest rate channel and on intertemporal substitution are less effective than in presence of a "conventional" aggregate demand shock. The uncertainty determined by the Covid-19 shock and the shutting down of businesses and the limits to mobility (Baldwin, 2020) determined by the containment measures finalized at reducing the rate of infection, cause economic activity to contract regardless of the level of the interest rates (Buiter and Kapoor, 2020)[20]. Second, the expansionary fiscal policies financed in deficit by issuing and selling government bonds to the private sector may result *ineffective* in increasing aggregate demand, due to Ricardian equivalence effects[21]; that is, "*people may be more inclined to save rather than spend tax cuts (or monetary transfers) when they know that the cuts and transfers increase future government interest costs and thus raise future tax payments for themselves or their children*" (Bernanke, 2003). In other words, since bonds have a maturity, the money that the government receives when it issues and sells bonds should be returned to the private sector when they mature, in addition to the interest rates that should be paid for as long as the security remains in place. This induces households and firms to save instead of consuming and invest (Galì, 2020).[22] The conclusion is that in order to "*strengthen the effects of fiscal policy, by breaking the link between expansionary fiscal actions today and increases in the taxes that people expect to pay tomorrow*" (Bernanke, 2003), expansionary fiscal policies should be financed with a State liability that does not expire, public money (e.g. monetary financing).

While **originally the expression 'helicopter drop' was coined by Friedman** in 1969,[23] the policy prescription of a fiscal expansion financed by printing money in order to fight deflationary risks became

[18] See for example Miles, March 30, 2020, "*It would then be entirely appropriate for the central bank to massively expand its purchases of government bonds to allow the necessary fiscal response and avoid bond market turmoil. It is in this light that one should view recent central bank decisions – by the Bank of England, the ECB, and the Fed – to undertake asset purchases and on a scale not seen before*".

[19] Modern monetary theory (MMT), Monetary Policy 3 (MP3) and Standing Emergency Fiscal Facility (SEFF) are different proposals, appeared in the economic debate in the recent years, to implement monetary financing in order to stimulate aggregate demand. These proposals differ mainly on aspects related to the governance necessary to implement the coordination between the monetary and the fiscal authorities and to the degree of coordination/independence of the different institutions involved. For a description of MMT see for example, Wray, L. Randall (2015). MP3 has been promoted by Ray Dalio, founder and CIO of Bridgewater investment fund. See for example Dailo (2019). The SEFF has been promoted by Elga Bartsch, Jean Boivin, Stanley Fischer and Philipp Hildebrand, who wrote a report for BlackRock Investment management company. See Bartsch et al (2009).

[20] The authors stress that "*this breakdown of the normal channels of transmission of monetary policy will be exacerbated as the economic meltdown takes its inevitable toll on banks and the financial sector. With risk aversion high, and the propensity to consume and invest low, normalization is impossible in any foreseeable horizon. Printing new money can help mitigate each of these critical challenges*".

[21] Or in any case they will have serious repercussions when the crisis will be over and governments will find themselves with much higher public debt than before the crisis with possible negative effects in terms of the cost of debt and limits to the ability to pursue expansionary fiscal policies in the future. Giavazzi and Tabellini, March 24, 2020, for example say that "*government support to the economy will be in the double digits as a percentage of national incomes. How can such amounts be financed, without sparking a second sovereign debt crisis in the weaker euro area countries?*"

[22] According to the author, "*unfortunately, such a strategy would only transfer the problem to governments, which would need to raise taxes (thus increasing the burden of households or firms, counterproductively) or to borrow in capital markets and increase their debt burdens (and be forced to raise taxes in the future). Even if the EU were to relax the restrictions on that further borrowing, it would be a risky strategy given the high debt ratios (above 100% of GDP in some cases) in many of the most affected countries, with the consequent risks of a debt crisis and an immediate rise in spreads".*

[23] Friedman proposed the following experiment: a helicopter flies over an economy that is growing at its potential dropping bills so that each citizen suddenly (and unexpectedly) has twice the cash he held before. A crucial assumption is that this is a unique event, which will never be repeated, and citizens know it. According to Friedman since the economy was already at its long-run equilibrium economic agents would not decide to save this additional amount of money: they will just spend it. Moreover, since the economy is running at its potential, there is no idle production capacity: production remains unchanged. The result is that after a transition period, the only change observed would be in terms of prices, which would double, without a permanent change in any of the real variables.

popular with a speech of Ben Bernanke in 2002. Since in most countries the Treasury and the Central bank are two distinct institutions, the implementation of this policy would reduce to the following steps: to finance its expansionary fiscal policy the government issues bonds that are purchased by the central bank, which returns the yields on those bonds to the Treasury in the form of seigniorage. From an accounting perspective, there is no difference between the direct distribution of money by the Central bank to economic agents and its indirect distribution channeled through the Treasury[24].

The Covid-19 crisis has spurred again the debate on helicopter drops and on different ways to implement it. The debate revolves around what mostly affects its effectiveness (Ricardian equivalence, price rigidity and targeted transfers) and what is usually considered as the main limit (legal feasibility and central bank credibility/independence).

Ricardian equivalence: in order to have agents perceiving that the money injection is permanent, some economists claim that the governments (or an European institution) should issue a perpetuity and the central bank should buy it (Galì, 2020a; Tabellini 2020);[25] other that the central bank should commit to permanently rollover government bond purchases once the bond matures (Barwell, Chadha and Grady, 2020);[26] others that the central bank should credit directly the Treasury account and contemporaneously reduce its net worth (Galì, 2020a)[27].

Price rigidities: Galì (2020b) compares quantitatively helicopter drops to conventional debt-financed stimulus in a New Keynesian model. The main results are: (i) helicopter drops provide a way to boost economic activity effectively, as long as prices are reasonably sticky, since "*when prices are sticky, aggregate demand and output are a function of current and expected real interest rates, which in turn are affected by the paths for the money supply and nominal interest rates. Those paths differ across financing methods* (money-financed vs debt-financed)"; (ii) money-financed tax cuts also appear to be more effective countercyclical policies than their debt-financed counterparts when the ZLB is binding.

Targeted transfers: many economists stress the importance to address the monetary transfers to targeted groups of households and firms that face tighter constrains in terms of consumption, investment and production. Wyplosz (2020) argues that "*targeted support is needed to face the economic dislocation provoked by the combination of the epidemic, health containment efforts and anguished reactions of individuals, firms and financial institutions. But indiscriminately throwing large amounts of money is not an effective way to deal with the myriad of bottlenecks that stand to grip the economic machinery.*" Gaspar and Mauro (2020) claim that *"households and businesses hit by supply disruptions and a drop in demand could be targeted to receive cash transfers, wage subsidies, and tax relief, helping people to meet their needs and businesses to stay afloat."* Simmons et al (2020) instead of an helicopter drops propose "*what we call "smart drone" money — a targeted invention in which consumers are provided with the equivalent of currency that they can spend on merchants that agree not to lay off permanent staff during a lockdown; smart drone rather than sprinkle money in an untargeted fashion it delivers it directly to where it is need most: the crisis-hit consumer and the small businesses struggling to survive."*

Legal feasibility: Reichlin and Schoenmaker, 2020 stress that the main limit of helicopter drops still remains, especially for the euro area, in the institutional framework and claim that "*this [quasi-fiscal monetary policy]*

[24] A similar proposal, the "overt money finance", was proposed among others by Adair Turner (2014), former Chairman of the UK Financial Services Authority, in response to the deflationary risks coming from the global financial crisis and the sovereign debt crises.

[25] Galì (2020a) proposes "*a conversion of ECB government debt holdings into zero interest perpetuities to be held permanently on the balance sheet, in exchange for a permanent reduction in the transfer of ECB profits to governments in proportion to the effective debt cancellation*". Tabellini (2020) proposes a programme under which the ESM would issue irredeemable Eurobonds, contemporaneously the ECB should announce that it will stand ready to buy them to keep the interest burden low enough and, finally, the ECB would purchase the Eurobonds. The author says "*it is essential to insist that they are irredeemable securities purchased at issuance by the ECB. Otherwise they may not be as resolutive as they appear to many today*."

[26] Barwell, Chadha and Grady (2020) say "*the Bank can engineer a helicopter drop through a credible commitment that monetary financing will be permanent. Purchases of government debt, whether made in the secondary market or in a more unorthodox manner via primary purchases, would remain on the Bank's balance sheet indefinitely*".

[27] Galì (2020a) says that "*the ECB should credit the government's account. That credit would not be repayable, i.e. it would amount to a transfer from the central bank to the government. From an accounting viewpoint, it would be captured by a reduction in the central bank's capital or by a permanent annotation on the asset side of its balance sheet*".

poses a problem of legitimacy since the central bank does not directly respond to taxpayers and implies a lack of response by the political authorities. Ultimately, this would harm its effectiveness". Buiter, 2020 claims, instead, that not implementing the institutional changes necessary to implement helicopter drops would be much more costly than implementing and "*it would be criminally negligent to allow a design flaw in existing treaties to inhibit the appropriate use of helicopter money at a time of existential crisis*". Others, claim that helicopter drops could be implemented inside the actual institutional frameworks (Yashiv, 2020; Ehnts, and Mosler, 2020; Rashida Tlaib, 2020; Bartsch et al, 2020).

Central bank credibility issues: Finally, some authors focus on the credibility issue and the risks that once a central bank enter into helicopter drops, it will lose control over price stability in the future. Goodhart and Pradhan, 2020) argue that since Covid-19 is mostly a supply shock which does not affect future amount of capital in the economy, once the effects of the shock will be over, the effects of expansionary policies will remain and inflation will surge; Fama, 2020 stresses that if such a measure is temporary such a risk does not exist ("*Cash transfers to businesses will be more effective than low interest loans. These should financed by money creation. This is a temporary helicopter drop that will, and should, cause a once and for all price increase. As long as it is temporary and does not lead to a permanent money financed deficit, it will not lead to inflation*").

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