Macroeconomic Policy Responses to a Pandemic*

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Abstract

Covid-19 has required lockdowns and other measures affecting workers that amount to a massive productivity shock. To alleviate the impact of that shock, many countries have enacted policies to avoid job losses, including subsidizing payrolls and providing financial support to firms that commit to retaining workers. We study such policies in the model of Céspedes, Chang, and Velasco (2020). The elimination of jobs in a pandemic is inefficient because of the interaction of two ingredients: (i) while workers may be unproductive during the pandemic, eliminating jobs harms productivity in the recovery; and (ii) employers may be unable to preserve jobs during the pandemic because of frictions that limit the credit needed for paying the wage bill. If, in particular, credit limits depend on the value of firms, the model yields amplification effects and unemployment-productivity-asset price adverse loops, possibly leading to multiple equilibria. In this context, the most effective responses may be unconventional policies that relax the financing constraints underlying inefficient job losses.

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I. Introduction

The world has seen many economic crises. But never before did it witness a crisis triggered by government telling firms to suspend operations and workers to stay home. Covid-19 is a negative supply shock of unprecedented size.

One of the most difficult aspects of managing this crisis is how to keep the population locked down while avoiding massive job losses. A firm holds much of its productive capital in the workers it has recruited, hired and trained. If the crisis forces an entrepreneur to fire those workers, the firm´s future productivity will suffer.

But why would private employers choose to dismiss workers instead of preserving those jobs until the pandemic is over? One answer is that employers may not be able to afford paying wages once production and sales collapse, if only temporarily. To keep paying the wage bill, the entrepreneur needs credit. And credit is notorious for being available at all times except when you really need it —in a crisis.

A bank may step in and lend, but it will typically ask for collateral. The catch is that smaller firms often do not have assets they can pledge. And larger firms find that at a time of great uncertainty the value of the physical and financial assets they hold is severely depressed, so those assets are not much good as collateral. The upshot is that many firms may be unable to borrow. And if credit does not flow, millions of jobs will be lost and massive amounts of entrepreneurial capital will be destroyed.

This story is a fair description of the current plight of many firms around the world. It suggests that permanent losses in productive capacity could be avoided by easing financial constraints. But loose ends remain. What determines the value of collateral? And how is that value related to the productivity of the firm and to the amount of labor it is forced to shed during the crisis? The story also begs many policy questions: What can governments do? Do conventional monetary and fiscal policies work in such a situation? If not, are there alternative policies that help support collateral values, save jobs and preserve firms´ entrepreneurial capital?

To think about the answers, a recent paper of ours (Céspedes, Chang and Velasco, 2020; CCV from now on) develops a minimalist macroeconomic model that emphasizes the interaction of two essential components. The first component is that cutting jobs during the pandemic can impair productivity in the recovery phase. The second component is that firms face financial constraints in the form of credit limits that depend on the value of assets that they can pledge as collateral.

In the model, labor productivity falls drastically in an initial phase of the pandemic, but returns to its normal level in a recovery phase —provided jobs are preserved. Hence employers would like to avoid job cuts during the pandemic, even if this implies a wage bill that exceeds production and sales. But the number of jobs that can be saved depends on employers' credit limits and, therefore, on the value of their collateral.

Assuming that the collateral of entrepreneurs includes the value of their firms, the two components of the model interact. The value of firms is determined by expectations of profitability and, therefore, of productivity during the recovery period. But this in turn depends on employment, which may be limited by the value of firms.

The model then implies amplification effects and an unemployment-asset price deflation doom loop à la Fornaro and Wolf (2020). In addition, multiple equilibria may arise in which employment, productivity, and asset values may be high or low according to market optimism or pessimism.

The model casts useful light on policy alternatives. Conventional fiscal and monetary policy are ineffective, since the problem is not a shortage of aggregate demand. Cutting interest rates has an indirect effect via asset prices —firms are constrained not by the price of loans, but by the available quantity of loans— but that effect may be small if the initial real interest rate is low. By contrast, there are several unconventional policies —wage subsidies, helicopter drops of liquid assets, equity injections, and loan guarantees— that, if sufficiently large, can keep the economy in a high-employment, high-productivity equilibrium in the aftermath of a pandemic.

All of these policies can restore efficiency by relaxing financial constraints. But because they entail channeling resources to firms beyond what incentive-compatible borrowing limits would permit, entrepreneurs may be tempted to misbehave, leaving taxes unpaid (in the case of a wage subsidy or a helicopter drop), absconding with profits instead of distributing them as dividends (in the case of equity injections), or defaulting on debts (in the case of loan guarantees). So the policies will be feasible insofar as government is willing and able to do what private agents cannot: deploy the power of the state to make sure all relevant financial obligations are fulfilled.

Most of the unconventional policies require the government to spend resources upfront, at a time of crisis when revenues are down. So, to fight the economic consequences of the pandemic, governments will need to run deficits (albeit for reasons that are different from the traditional Keynesian reasons). And private sector firms, which have to keep paying wages while their sales and productivity are sharply down, will also be running deficits. A country that adopts anti-virus policies is therefore likely to run a current account deficit. The capacity to borrow, for both the government and the nation as a whole, becomes critical. Emerging market economies that are rationed out of capital markets may find they cannot afford anti-crisis policies unless the rest of the world channels fresh resources to them.

II. The CCV model

CCV studies a pandemic episode in an economy that is small and open. The focus is on two periods which can be thought of as an initial contagion phase followed by a recovery phase. There is a single tradable good in each period, and an internationally-traded bond. Households and entrepreneurs live side by side. Households work, save and may lend resources to entrepreneurs. Entrepreneurs produce and may borrow to finance operations.

The model's action is with firms and their borrowing and production decisions. Output is produced using labor only. The pandemic shock means that labor productivity collapses in period 1 so that, in the absence of adjustment costs, firms would reduce labor employment in that period. But we assume that finding the right workers and hiring them takes time and is costly, so that if an entrepreneur fires them today she will not be able to resize the firm´s labor force to a different optimal level in the future. The extreme version of this assumption, which we adopt, is that labor input is set in period 1 and cannot be changed in period 2.

In the first period, because of the virus, labor produces no output. In the second period the virus subsides and output depends on both employment and labor productivity. A key assumption is that productivity itself depends on employment, denoted by n. If in response to a shock the firm is forced to shed crucial employees and take employment below a certain threshold $\tilde{n}$, productivity will drop.

We assume that productivity is large relative to wages so that the typical entrepreneur would choose to make employment as large as possible, at a level $\bar{n}$. In the absence of other frictions, firms would retain the workers they had before the pandemic even if they temporarily produce nothing, because period-2 profits will be large enough to justify paying wages in period 1 to retain workers.

Firms have no income in period 1, so they must borrow to pay wages. The sum borrowed, d, depends on the level of employment and the entrepreneurs´ initial holdings of liquidity. We call this the CD schedule, for credit demand. It slopes up in (n, d) space because the higher is employment, the more the firm has to borrow to pay wages in period 1. Note that CD must hold in any equilibrium.

Realistically, however, financial constraints may prevent firms from operating at maximum scale. Assuming that there is an upper limit to the firm's debt then places also a ceiling on employment. In CCV the assumption is that the debt limit is given by the value of the firm. To prevent default from happening, lenders demand the firm´s shares as collateral.

If borrowing constraints bind in equilibrium, the debt level d must equal the value of the firm. We call this the FC schedule. It has that shape (piece-wise linear, mathematicians call it) because productivity can be high or low depending on whether employment is above or below $\tilde{n}$. And FC slopes up in (n, d) space, because higher employment mean higher profits, which in turn enlarge the value of collateral and the amount that firms can borrow.[1]

Figures 1-3 depict equilibria with the help of the FC and CD schedules. Depending on parameter values, equilibria can be constrained and unconstrained, and multiple outcomes can coexist (in which case equilibrium is pinned down by self-fulfilling expectations). Here we provide only a graphical and intuitive treatment. Readers interested in technical details can consult CCV.

[1] We assume that the FC schedule is always flatter than CD.

Figure 1: single unconstrained equilibrium at $\bar{n}$

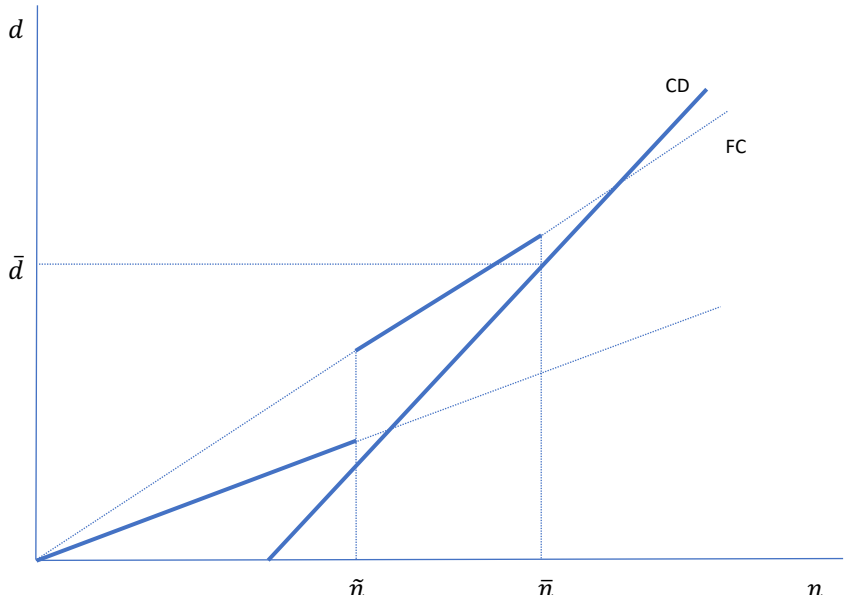


Figure 1 depicts the case of a single unconstrained equilibrium at $\bar{n}$. At $\bar{n}$ the amount of debt, given by $\bar{d}$, is less than the value of the firm. This confirms that the firm can finance maximum employment without violating its borrowing constraint.

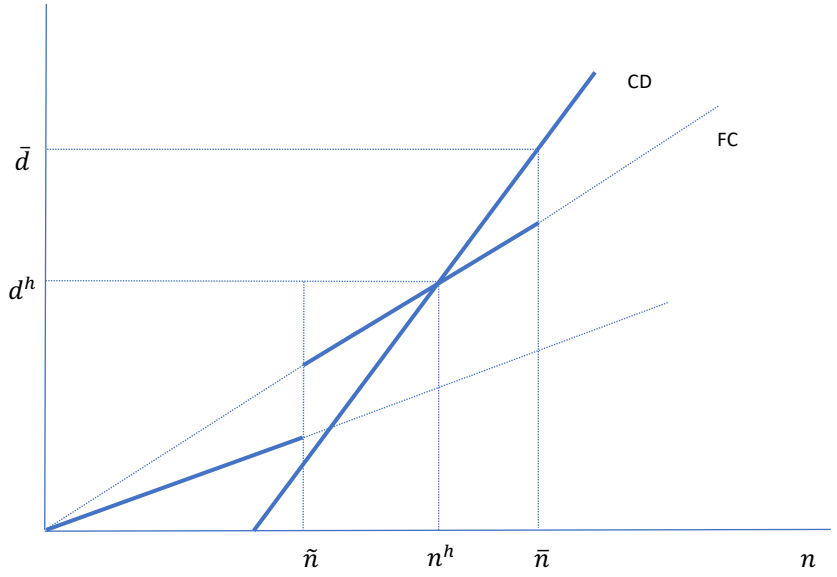
From the figure it is apparent that given FC, the unconstrained equilibrium is more likely if CD is lower. This would happen if the firm´s initial net worth is sufficiently large, so that the firm can afford to borrow little and still not shed labor when the virus hits. Likewise, given CD an unconstrained equilibrium is more likely if the FC schedule is steeper, which is the case if labor productivity is high.

Because an unconstrained equilibrium involves full employment and productivity is as high as can be, there is no efficiency case for policy intervention in the case of Figure 1. Note that this means that the occurrence of a pandemic is not, by itself, enough justification for active policy.

Things change if firms' initial wealth is lower or financial constraints are more stringent. Then the economy can have a single constrained equilibrium, as depicted in Figure 2. Here firms cannot hire $\bar{n}$ workers because that would require more collateral than they have: at $\bar{n}$ the amount of debt implied by CD exceeds the value of the firm, given by FC. Firms must then reduce employment to n^h, the highest level they can finance given the value of the firm.

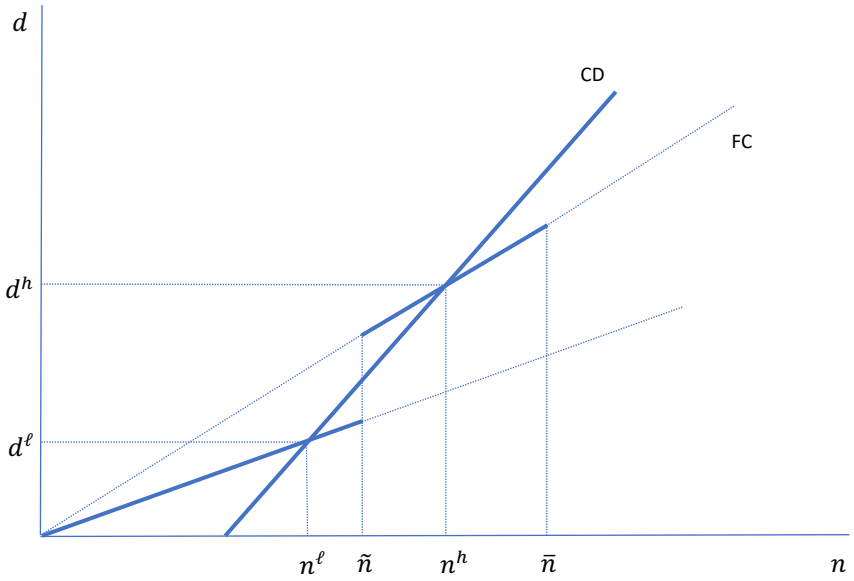
Because both the CD and FC schedules slope up, the economy responds to adverse shocks with large magnification effects, in what one might call an unemployment and asset price deflation doom loop (Fornaro and Wolf, 2020). For instance, if starting at an equilibrium such as that in Figure 2, the firm starts out with one fewer dollar of initial net worth, its capacity to hire workers and pay wages goes down by more than one dollar, with the multiplier reflecting reduced access to outside finance through an drop in the value of the firm.

Figure 2: Single constrained equilibrium



The case in Figure 3 involves two borrowing-constrained equilibria, with employment at the low level n^ℓ and the high level n^h. If potential share buyers are optimistic, strong collateral values enable firms to borrow and raise employment above $\tilde{n}$. Productivity is high, making optimism self-fulfilling. Conversely, pessimism causes low share prices, reducing access to finance. Employment falls and expectations of low productivity are justified.[2]

Figure 3: multiple constrained equilibria



[2] There exist other possible configurations, which we do not depict here for the sake of brevity.

III. Policy alternatives

In this model conventional demand management policies are ineffective. The problem arising from the virus is one of supply. Demanding more goods from the representative firm has no impact if the firm is constrained from producing them. Raising government expenditures on goods does not help alleviate the firm's bottlenecks, which are financial in nature.

Interest rate cuts can help, but not in the usual way. Lowering rates can increase the value of firms and, in a financially constrained equilibrium, relax credit limits. While there is no money in the CCV model, we can glimpse how lower interest rates might work by considering a policy of government interest subsidies to firms.

Suppose that in period 2, when loans came due, firms would only pay a fraction of the market rate and the government would pay the rest. This reduces the interest rate that firms effectively face. Firm values, which are determined by future (pledged) profits discounted back to the present, must then go up. Credit limits are relaxed as an implication, allowing firms to raise employment if they were financially constrained.

In practice, however, this policy can be of limited use. If the starting world interest rate ρ is close to zero, there is little room to subsidize interest costs. And in an uncertain environment, asset prices are unlikely to be very responsive to interest rate subsidies.

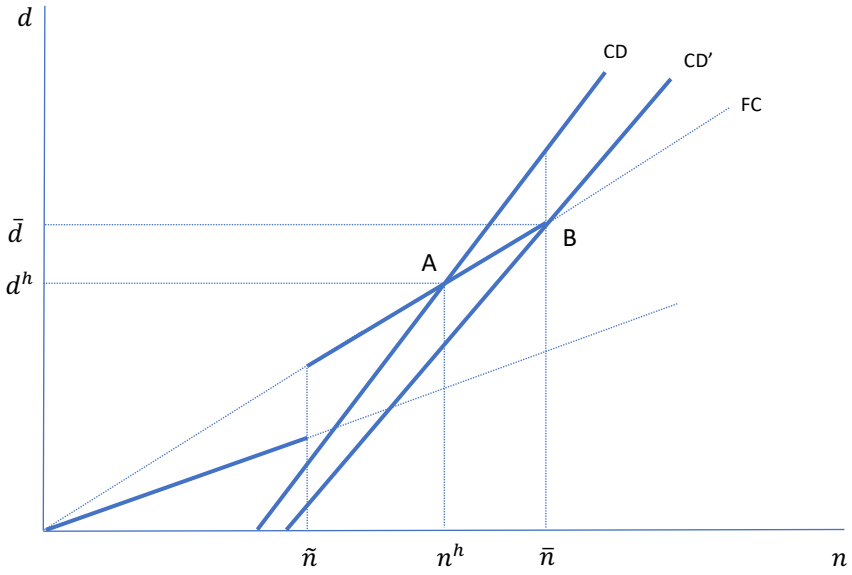
Given these difficulties, are there other policies with a higher chance of being effective? In the CCV model, the crucial issue is to enable firms to survive the initial contagion period without shedding too many jobs. This suggests several unorthodox policies that temporarily help firms finance wage costs and retain workers.

The simplest such policy is to have the government pay the firms´ wage bill, so that employment can remain at the optimal level $\bar{n}$. Such a policy causes the CD curve to shift right and become flatter, as in Figure 4. Equilibrium moves from point A to point B. Employment goes up, reflecting that the wage subsidy reduces the firm's financing requirements and therefore also makes it less necessary to shed workers in period 1.

In Figure 4, the wage subsidy is large enough to bring about full employment $\bar{n}$. Of course, this requires the government to have enough fiscal space to borrow and fund the operation.

Note that the possibility of multiple equilibria makes the policy problem more delicate. If the initial situation is one with two constrained equilibria, as in Figure 3, a wage subsidy may take the economy to an equilibrium with employment at $\bar{n}$, but it may not if expectations are adverse: depending on the minimum efficient scale and other parameters, the subsidy may not be enough to eliminate the multiplicity of equilibria.

Figure 4: Wage subsidies



In that case the government would be spending fiscal resources but could not guarantee that the economy would settle on the full employment outcome. In order to achieve this outcome, the subsidy would have to be higher, so as to shift the CD curve clockwise even further. Of course, the larger subsidy to eliminate the possibility of the bad equilibrium would require even more fiscal space and a larger tax in period 2.

A policy equivalent to wage subsidies is the proverbial helicopter drop of liquid government assets. The government could supplement the firm's initial net worth by sending out to firms the required amounts of government bonds bearing the market rate of interest and maturing in period 2. In turn, firms could sell the bonds to pay the wage bill or —even easier— could simply pay workers in government bonds.

Because there are no imperfections other than the borrowing constraint and the pecuniary externality that gives rise to multiple equilibria, in this model the issuance of liquidity through government bonds does not create net wealth. So this policy is not very different to the one in which the government pays the firms' wage bill.

Wage subsidies and helicopter drops help protect employment by providing firms with liquid resources they can use to bypass binding finance constraints. But they do not attempt to alleviate the severity of those borrowing constraints. Other policies go further in that direction. One alternative is an equity injection, by which we mean that government temporarily acquires ownership and control of firms in exchange for initial liquidity provision.

In order to illustrate how equity injections might work, imagine that without government intervention the economy would settle on a unique equilibrium like the one described in Figure 2. In this equilibrium entrepreneurs would like to raise employment to $\bar{n}$, but they cannot borrow the amount they would need to finance the additional wage costs.

To correct this situation, the government may inject resources into the firm and as a result acquire control rights. These control rights imply, in particular, that in period 2 the government can secure repayment out of the firm's final profits.

In terms of Figure 2, the equity injection would move CD to the right until it intersects FC at the full employment level $\bar{n}$. An interesting fact is that the injection does not need to be as large as the additional amount the firm needs to retain the workers that will ensure full employment.

Why? Because the equity injection leads to higher share prices, allowing the firm to borrow more. The policy is particularly effective since government resources are leveraged up, in the sense that the injection allow the firm to finance an increase in the wage bill of more than e, the difference reflecting better access to outside finance through an increase in the value of the firm.

So equity injections can be powerful tools. They can be so, however, on the assumption that they give the government the power to seize a fraction of the firm's profits that cannot be pledged to other outside investors, perhaps because it has acquired control (seats on the board of the company) in exchange for the equity injection.

In the absence of formal board appointments, the government could impose conditions regarding dividend payments, stock buybacks and executive compensation, so as to ensure that the resources from the equity injection are first used to hire $\bar{n}$ workers and raise productivity, and then in period 2 to pay the corresponding dividends and debt service.

An obvious caveat is that equity injections, coupled with temporary government control, make sense for firms above a certain size. It would make little senses for government to inject equity and attempt to run the corner shop or the restaurant down the street.

Similar observations apply to credit guarantees, in which the government promises lenders to pay a fraction of their loans outstanding in case of default by the firm. In terms of the previous figures, the credit guarantee would move the FC schedule counterclockwise from the origin.

It is apparent that a large enough guarantee would be able to raise employment to $\bar{n}$. So this policy might seem like a win-win: it would deliver the full-employment, high-productivity equilibria without requiring fiscal resources in period 1. But there is a catch: the guarantee may expose the government to moral hazard. From the perspective of the entrepreneur it would be optimal to default in period 2 and abscond.

So credit guarantees, like equity injections, may not sufficient by themselves. In order to make the guarantees incentive-compatible, the government would have to combine them with a strengthening of the incentives for the entrepreneur to repay. That is exactly what some European governments have done, excluding from loan guarantees those companies that operate out of tax havens. Alternatively, the government could again condition the provision of a guarantee to the suspension of dividend payments or the limiting of executive compensation.

IV. Conclusions

Several unconventional policies —wage subsidies, liquidity injections, equity injections, and loan guarantees— if sufficiently large, can keep the economy in a full-employment, high-productivity equilibrium in the aftermath of a pandemic.

What these policies all have in common is that government provides entrepreneurs with resources in excess of what borrowing constraints, which are really incentive constraints, would have allowed. The policies differ in terms of the implied enforcement requirements, since the entrepreneur has an incentive to abscond with a share of the profits, leaving taxes unpaid (in the case of a wage subsidy or a liquidity injection), dividends unpaid (in the case of equity injections), or debts unpaid (in the case of loan guarantees). So the policies will be feasible insofar as government is able to do what private agents cannot: compel entrepreneurs to play by the rules.

Keep in mind that the unconventional policies analyzed in this paper may not be applicable to firms and workers in informal sectors, which easily amount to more than half of the economy in some developing and emerging nations (see e.g. Bosio and Djankov 2020). On the other hand, even if unconventional policies only help formal agents directly, they can also benefit informal ones indirectly. And if the policies lead to a stronger economic recovery, they may provide incentives for agents in the informal sector to adhere to lockdowns and social distancing directives, therefore reducing the size and consequences to them of the "health shock" (Chang and Velasco 2020).

All these unconventional policies become more complex in the presence of multiple equilibria. The size of the intervention necessary to make full employment feasible is not necessarily one that will rule out other less attractive equilibria with lower employment and potentially lower productivity. A larger intervention may rule out the bad equilibria, but it will necessarily be a more expensive intervention, which may not be affordable for governments with limited fiscal space.

Fiscal space is a big issue. In all of our exercises above we assumed that the government could borrow more or run down assets in period 1. That is not problematic for most advanced economies, but could be a difficult issue for many emerging market governments, whose ability to borrow large amounts may be severely limited, particularly during a pandemic-driven crisis.

Moreover, constraints on international borrowing could also be an obstacle to the implementation of unconventional policies. In all scenarios, policies involve inducing the firm to run a deficit (it keeps paying wages even though it has no revenue) and prompting the government to run a deficit (spend today and raise taxes tomorrow). So the country as a whole will be running a current account deficit.

Who will finance the current account gap? Only a few countries are short-term net creditors, in the sense of holding more short-term claims on the rest of the world than the rest of the world holds on them. For all other countries, the only way out in the event of a pandemic is to borrow abroad. But it could well be that the country is rationed out from international private capital markets, or that international capital markets effectively freeze for a period of time, as it happened in 2008-09. Then the country as a whole (the private *and* public sectors) would not have access to the necessary resources to finance the interventions required to guarantee the full-employment, high-productivity outcome.

In theory, official lending, either on a bilateral basis or through multilateral lenders such as the IMF or the World Bank, could make up the difference. But one thing this crisis has confirmed is that multilateral lenders have nowhere near the volume of resources required, and their main shareholders (the large advanced countries plus China) are reluctant to provide more capital. Large shareholders like the U.S. have also refused to provide more short-term international liquidity via an extraordinary issue of SDRs. So, for many countries living through this pandemic, welfare-improving policy interventions may be unattainable simply because of lack of resources from abroad.

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