

## **The Covid-19 crisis calls for preemptive monitoring of production and distribution chains**

*As economies around the globe shut down, governments and central banks are announcing radical policies to avoid economic collapse. The first projections are alarming: unemployment across the world may increase by dozens of millions, and the output drop in several countries may reach double digits. However, the goal of avoiding economic collapse is in conflict with the goal of containing the pandemic. Italy's decision to shut down all non-essential business activities is a dramatic example of this conflict. Governments in other countries must pay very close attention to the situation in Italy, learn from it and act preemptively. With a significant fraction of workers sick or in quarantine, the stay-at-home policies, and the closing of borders, the possibility of disruptions in supply chains must be given proper consideration. With disruptions in the supply chain and possible surges in demand due to panics, free prices no longer act as a suitable coordination device, as firms may not be able to react to price incentives, for example, due to intermediate goods or labour supply shortages.*

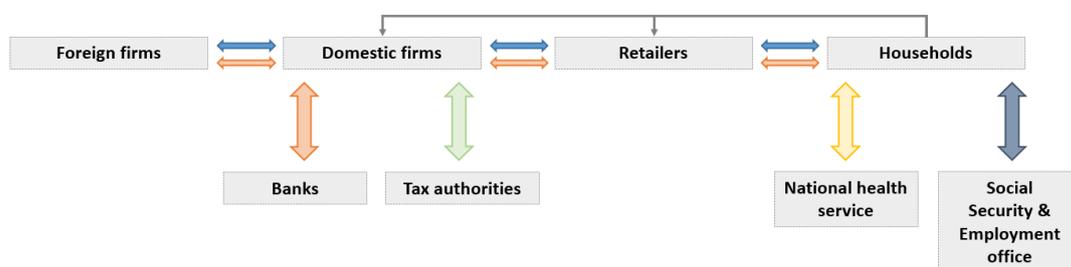
*To guarantee access to essential goods during the pandemic crisis and keep the economy functioning, we propose the urgent creation of a monitoring crisis cabinet composed of both private and public sector professionals and governmental officials. The aim of such a monitoring cabinet is to collect and use real-time big data to anticipate and, ideally, avoid interruptions in the supply of essential goods. Once there is the prospect of a rupture in the supply, the Government may issue warnings in advance and inform the population about the date when products will be available again. In such a case, private firms must cooperate in conjunction with governments to assure the stream of supply of essential goods within and across European borders.*

*In democratic regimes with decentralized economies, disruptive events of the magnitude of the Covid-19 pandemic - which impacts all members of society at the same time - must be given a response that safeguards both material well-being and democracy. The action of the Monitoring Cabinet may contribute to a sense of confidence and control of the crisis among the population, helping to avoid panics and social unrest. The great perils we face call for an EU monitoring and coordination interacting with national counterparts.*

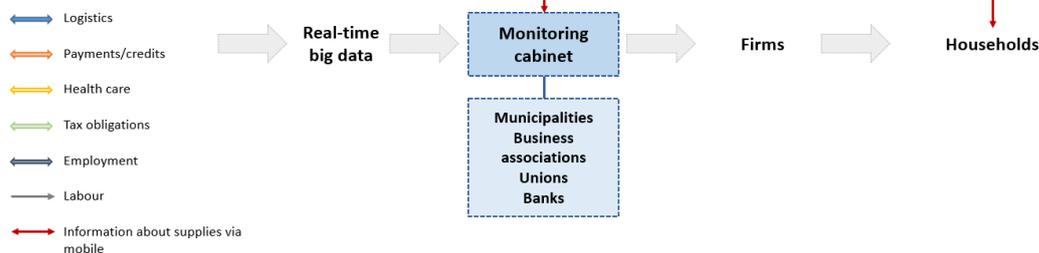
In modern decentralized economies within a worldwide context, each good or service is, in most cases, produced by firms, which may be located in different countries, responding to prices. Suppliers of one good assess the state of the market for that good and decide how much to produce. They also determine the combination of capital, labour, and intermediate goods to use in production. Figure 1 describes the flow of goods and labour (Part A) and information (Part B) across the production and distribution chains.

**Figure 1: Monitoring and coordination**

**Part A**



**Part B**



One immediate impact of the Covid-19 outbreak is that some workers miss work because they are ill. The effect on labour is magnified because of the quarantine that co-workers will have to follow. Moreover, one typical response to the Covid-19 outbreak is the stay-at-home requirement. All this imposes a separation between workers; capital and labour; and also between suppliers and customers, either intermediate or final. This means that the flows connecting firms, other firms (domestic and foreign), and households in Figure 1 will be broken. Information from the Health System, Social Security and Employment Office will be vital to evaluate the availability of the workforce. **Information on employment and on absentism and its motives should be collected in real time** as individuals are deemed unable to work either because of hospitalization or mandatory quarantine. Flows of workers between distinct situations (employed at work, sick, quarantine, unemployed) will be more fluid than in normal times.

Faced with the falling demand, or the lack of workers, or just the tremendous uncertainty we now face, firms may have to or choose to stop production or even close down. As they close down, the probability of entering a vicious circle is enormous. Their suppliers see the demand for their output decrease and may also close down; at the same time, their customers are left without supplies and may also be forced to close down. **Households may be deprived of essential goods.**

The maintenance of this chain of production is especially important in the context of a paradigm of close to zero stocks (or the *just-in-time* paradigm), which implies that if one supplier stops producing, the customer firm will not have stocks to keep its production running. In other words, if one firm stops producing, all its customers and the customers of its customers will also stop producing soon after.

The globalization of production activities adds an additional layer of complexity to this problem: the production chain interweaves firms from different countries. This dimension of economic integration is even more acute in the European Union, where trade flows across countries are very intense. If intermediate goods cannot flow between countries, production will stop in the countries where the customer firms are located. The fact that the current crisis is global means that this mechanism will be a critical element in the unfolding of the economic crisis. The closing of national borders in the European Union, for sanitary reasons, raises concerns about the circulation of goods between countries and, therefore, about the status of production chains in Europe. **Ensuring that borders keep open to international circulation of goods is therefore of paramount importance.** Closing national borders and shifting production of goods and services to national sources will lead to further losses and inequalities across Europe, especially in smaller countries.

The nature of this crisis has also produced a sudden massive change in the structure of demand. The demand for health care and certain health-related goods has increased sharply, as well as demand for communications, home delivery services, and storable food. On the other hand, demand for certain durable products (namely cars), gasoline, and many services (travel, tourism) has plummeted. On the supply side, specific sectors have shut down or are severely constrained. The market mechanism will lead to an increase in the price of the goods that are now in high demand, and to lower prices of the products in low demand, to bring the market to equilibrium. Higher prices (meaning higher profits) will signal entrepreneurs to shift resources to the production of those goods, away from the production of products that are now in low demand.

In some instances, a production facility can be quickly redesigned to produce different goods, and workers can change their production activities with little trouble. In others, it may not be easy. One critical factor is the time horizon for the reorganization/investment decision: firms may decide not to change their line of business if they believe that the current surge in demand will not last long enough to make the investment profitable. One week after the Covid-19 outbreak, some Portuguese firms were already converting their factories to produce goods in high demand. For example, apparel and textile factories are now producing personal protective equipment. One brewery factory is using high-proof alcohol adapted to make hand sanitizer. A group of entrepreneurs gathered several firms, universities, and public agencies to produce ventilators. These are excellent news.

**However, in the current situation, the market mechanism, or entrepreneurs' 'moral sentiments', alone may not be enough.** First, we may not be able to wait the required time for the market adjustment to balance supply and the society's critical needs. Second, the unconstrained market equilibrium may imply disrespecting mandatory stay-at-home instructions, with negative externalities. Third, under the current exceptional circumstances, prices may become an ineffective coordination device. For example, due to a shortage of supplies or workers, firms may be unable to increase production in response to a price surge. In such a case, prices will no longer act as a signaling device but rather as a rationing device. One that guarantees that only the more affluent will always have access to essential goods. The equilibrium prices may be so high that parts of society would react angrily, and social cohesion and, in the extreme case, even democracy would be at risk. Under these exceptional circumstances, it may be possible to achieve a better outcome by central monitoring and coordination of the decisions of the various agents. At this point, price gouging needs to be monitored closely by existing economic authorities. Some preventive rationing may be considered in some essential goods to ensure that no artificial scarcity is created by stockpiling (this is particularly true for medicines, but it may apply to other essential goods or high-demand goods under the pandemic circumstances).

In this scenario, we propose that central monitoring and coordination would be carried out by a monitoring cabinet - see Part B of Figure 1. **This Monitoring Cabinet would aim at detecting problems (bottlenecks or insufficient production levels) along the production and distribution chains of essential goods in real-time.** The Monitoring Cabinet should be seen as a catalyst for private sector, profit and non-profit, initiatives that intend to promote the sustainability of supply chains and of international trade flows critical to ensure availability of essential goods.

When problems in the production and distribution chains are detected, it should pass on that information to entities such as public agencies (e.g., regional employment centers), municipalities, business associations, unions, and banks, so that obstacles to production are eliminated timely and in a coordinated way. If the Monitoring Cabinet is successful at identifying problems in the production and distribution chains, it can inform the population about the availability of goods in a credible and reassuring manner. In a democracy with a decentralized economy, monitoring and coordination may be an effective way to prevent that temporary shortage of goods evolves to generalized hoarding or even panic, which would only make the situation worse.

**To achieve its goals, the Monitoring Cabinet will probably have to take three steps.**

**The first step** is to identify the goods and services that should be prioritized in the current crisis. Obviously, medicines, medical equipment, protective equipment, and testing kits, besides food and other goods related to basic needs, communications, and the services provided by public utilities, must be given priority. The logistic activities needed for delivering the goods are also indispensable.

**The second step** is to determine the input-output linkages that lead to the desired output. Detailed real-time information at the firm and individual level will be essential for estimating demand by region and by type of good, and to monitor production chains. This information may come from national statistical offices, the health system, tax authorities, social security, banks, utilities, retail and communications firms, and firm managers. Additionally, each household may become a source of information about the availability of supplies by making use of its mobile phone. National statistical offices and sector regulators would integrate the different datasets and share them across the EU (with full respect of GDPR – data privacy regulations). This colossal endeavor may require the joint effort of experts from public agencies, universities and private companies. Real-time data and data analytics may provide an essential contribution to the analysis of the information and to the definition of adequate measures.

**The third step** is to determine which resources may be allocated to the industries in the essential input-output linkages, either from unemployed resources or from resources allocated to non-essential activities. This monitoring/coordination effort will depend on the answers to questions such as the following. Can workers in non-essential activities be trained, in a short time, to work in essential activities? Can they move to the region where the vital production takes place? Can they work under the required safety conditions? Can they be isolated to ensure that they are not infected? Can immune or

low risk persons (e.g, under 50 with no health pre-conditions) persons be conscribed to work in essential activities? Can big data/data science techniques be useful for estimating demand and optimize resource allocation? Can a pack of essential goods that can last for two weeks be designed (according, in particular, to dietary guidelines) and be distributed to those in isolation? Can 3D printing be useful?

Some monitoring and coordination activities may be carried out at a municipal level. At this level, there may be a more detailed knowledge of the structure of economic activities, and also because it may be unfeasible to do this sort of analysis quickly at the national level. **The monitoring and coordination activities will need the involvement of municipalities, business associations, unions, banks, retailers, among others.**

However, local industries employ inputs from other regions, and domestic firms rely on inputs from other countries. Therefore, it is necessary that the municipal analysis is coordinated at the national level, and that national plans are coordinated across countries, essentially at the EU level.

**The Monitoring Cabinet should include** specialists in logistics, operational research, engineering, big data/data science, and input-output analysis, from both the public and the private sector, from universities, from armed and police forces, from wholesale, retail and transport firms, from the firms that produce goods and services identified as essential (or essential for the production of essential products and services), from financial institutions, from management consulting firms, besides government and municipal staff, civil protection entities, and legal experts.

The leading retail companies have an extensive and granular presence in the whole territory. Those retail chains have full and real-time information about the suppliers (national and international) and about the risks of stock shortages. In the context of the Covid-19 crisis, cooperation between the leading players in the retail market is crucial to ensure the timely distribution of essential goods to the population. For example, in a specific location, if no retailer has enough workers to maintain its store open, perhaps it will be possible to keep one open by allocating all the workers to just one of the retailers.

Credit and payments flow mainly through networks built by financial institutions. Like retail firms, financial institutions have branches across the whole territory, and their payment networks are used in all the major retail outlets. Therefore, they too have detailed information about economic activity, but from the point of view of monetary flows. Besides, they have information about the financial condition of their customers (households and firms), especially of those that received credit. It is vital to monitor the

financial health of economic agents to prevent liquidity shortages and the onset of a financial crisis.

The Monitoring Cabinet must be accountable to the democratic institutions. Monitoring Cabinets across the EU need to work in close cooperation with each other, in a network mode, to ensure international trade flows are uninterrupted.

**The success of this approach will depend crucially on free trade.** Exceptionally, labour mobility in the EU has been severely restricted. From an economic point of view, this may not be a huge problem as long as goods and services keep flowing. However, in times like this, some governments may face pressures to block exports of essential goods. The president of the European Commission, Ursula von der Leyen, warned that trucks carrying medicine and other goods are blocked at the frontiers. Therefore, crisis management must also be done at the European level - close coordination between national governments is crucial. We cannot be caught in a blocking situation in which countries prevent the mutual supply of strategic goods and services. The failure to support Italy cannot be repeated. The great perils we face call for an EU monitoring and coordination cabinet interacting with national counterparts. If this is not solved quickly, not only is the EU at risk in the medium run but also, in the short term, everybody loses.

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