

Global macro matters

Estimating the economic impact of the COVID-19 shock

Vanguard Research | June 2020

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The spread of COVID-19 has forced a sharp fall in economic activity worldwide. Investors should expect a deep and short recession followed by a slow and uneven recovery. In this note, we walk through Vanguard's approach to estimating the impact of the COVID-19 shock on GDP in 2020 and beyond.

Economic modeling at a time of extreme uncertainty

We leverage a wide range of traditional economic data and higher-frequency indicators to inform our modeling. In our analysis, we distinguish the economic impact of COVID-19 across three distinct dimensions:

- 1. Sectoral variation:** Because the virus and the subsequent containment measures affect each sector of the economy differently, a bottom-up sectoral approach is required. Sectors with a higher degree of face-to-face interaction will be hit harder and face a longer period of recovery than those that can operate well with social distancing measures in place.
- 2. Supply and demand:** Supply will ultimately be a function of each government or state's containment strategy as well as business-level decisions. Typically, sectors that require a higher degree of face-to-face interaction will take longer to recover than others. Demand will be affected by lower aggregate incomes, the response by monetary and fiscal policymakers, and the "fear factor." We expect that consumer reluctance to take part in higher-risk activities will be heavily driven by progress toward an effective vaccine or therapeutic treatment. As a consequence, we expect the demand shock to persist much longer than the supply shock absent an unexpected health-related development.
- 3. Country/regional variation:** We account for differences in economic impacts across countries and regions. These differences can be attributed to variation in the timing and severity of outbreaks, government containment strategies, and monetary/fiscal policy responses, among other factors.

We first describe the two stages of our framework: calibrating the size of the initial shock and calibrating the persistence of the shock. **Figure 1** illustrates our analysis for the U.S. economy. We then summarize our GDP forecasts across the major regions we cover.

Step 1: Calibrating the size of the initial shock

We calibrate the magnitude of the initial shock with the help of traditional metrics and high-frequency data. These include real-time indicators such as electricity consumption, mobility indexes, restaurant bookings, and flight activity. We then combine these data with information provided by governments on the rules and restrictions imposed on different sectors during lockdown.

The impact of containment measures is not equal across industries. Sectors that are highly reliant on face-to-face interactions, such as retail trade, hospitality, and transport, are experiencing a large shock to activity. However, sectors that can operate relatively well with social distancing in place, such as construction and manufacturing, are less affected.

Step 2: Calibrating the persistence of the shock

To model the persistence of the COVID-19 shock, we use an autoregressive process as defined by **Equation 1** below. The level of GDP is modeled as a function of three main inputs: the initial shock to output (e), the level of output before the shock (\bar{x}), and a shock persistence factor (ρ).

Equation 1.

$$x_t = (1 - \rho) * \bar{x} + \rho * x_{t-1} + e$$

x_t = output level at time t

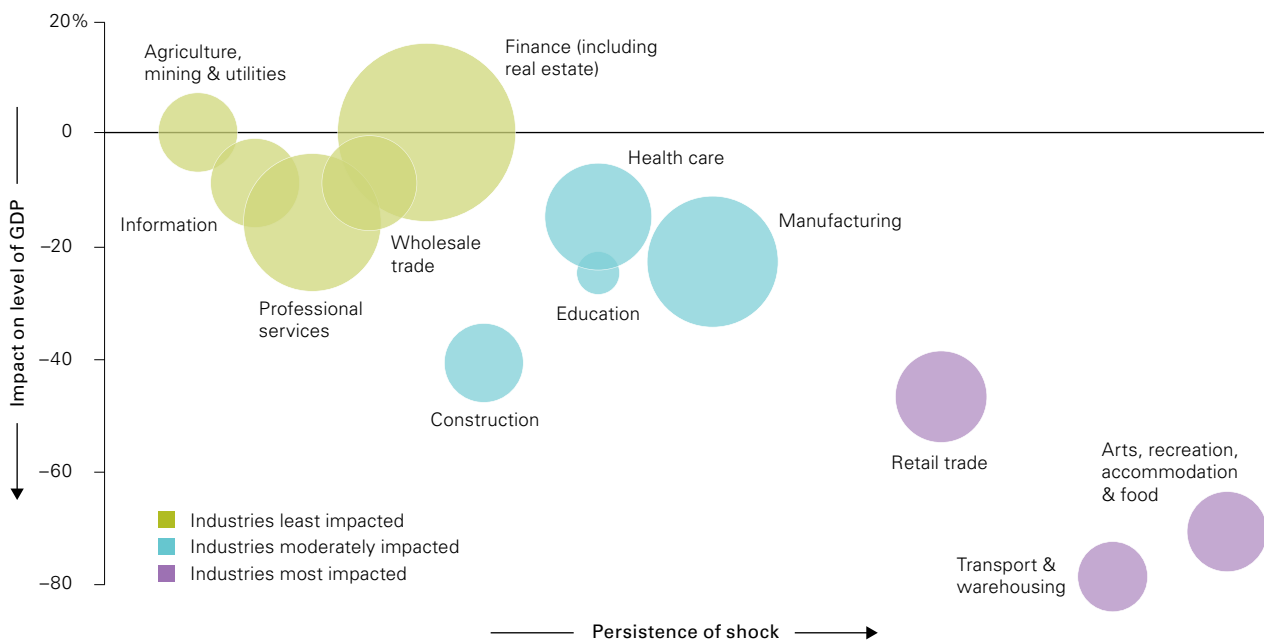
ρ = persistence of the shock

\bar{x} = pre-shock output level

x_{t-1} = output in previous period

e = shock

Figure 1. The COVID-19 shock will have a varied impact on different sectors of the economy



Notes: Size of bubbles indicates the relative weight of each sector in U.S. GDP. Initial impact on the level of GDP and the persistence of shock estimated is based on a range of high-frequency indicators (such as mobility indexes, fuel consumption, retail foot traffic, and restaurant and hotel occupancy) and traditional economic indicators.
Sources: Google, Apple, Johnson Redbook Index, American Iron and Steel Institute, U.S. Department of Energy, Association of American Railroads, U.S. Bureau of Labor Statistics, Prodc Analytics, Smith Travel Research, OpenTable, Transportation Security Administration, and SimilarWeb.

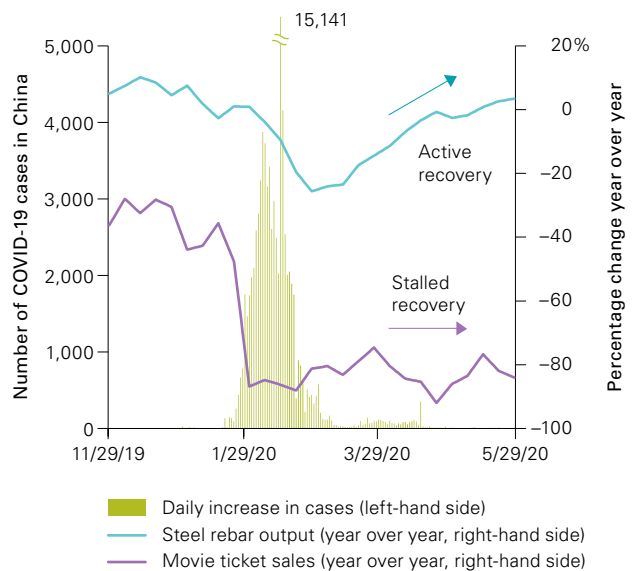
Assessing the recovery of the supply-side of the economy first, we classify sectors into low, medium, and high risk based on the feasibility to telework and/or the proximity of workers in the production of the good or service. Examples of low-risk sectors, which have a lower shock persistence (ρ), include agriculture (where production is socially distanced by nature) and professional services (where teleworking has proven rather effective with only minor productivity drags). By contrast, examples of high-risk sectors, which have higher shock persistence, include transportation and indoor recreational activities, where social distancing is more difficult.

We expect the recovery in aggregate demand to take longer than that of supply. The persistence of the demand shock will depend on both the recovery of incomes and the fear factor associated with engaging in face-to-face activities. The latter may not fully dissipate until a vaccine or therapeutic treatment is found, which will likely extend the recovery into 2021 and beyond.

Regional experiences provide a glimpse into the future

We can also use the experience of economies that are further ahead in tackling the virus, such as China, to help us calibrate what to expect in regions that are behind, such as the U.S. and Europe. As **Figure 2** shows, China's manufacturing sector, as proxied by steel output, has recovered much more quickly than have social activities such as going to the cinema, where consumer reticence is still elevated.

Figure 2. The experience in China can help us understand what might occur in the U.S. and Europe



Sources: Vanguard, using data from Our World in Data, Wind, and Baidu.

Aggregating this, **Figure 3** shows our baseline forecasts of the level of GDP for the United States, the euro area, China, and the United Kingdom. In the U.S., we expect output to be more than 10% lower in the second quarter of 2020 before staging a slow and gradual recovery. U.S. GDP is not expected to get back to its pre-virus level until the end of 2021, and it likely will be well beyond that before it closes the output gap.¹

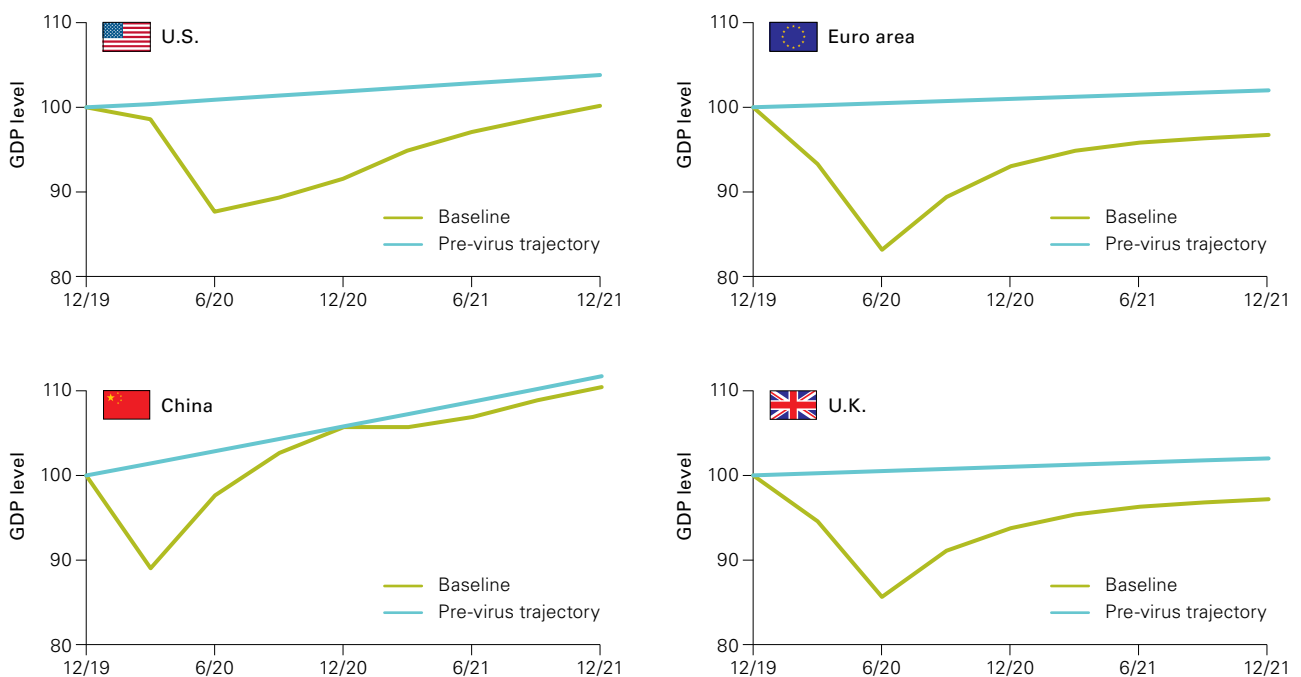
We expect slightly different trajectories for the level of GDP in other regions. This can be explained by a variety of factors, including differences in the timing and severity of outbreaks, the strictness of government lockdowns, the speed of the lockdown exit across sectors, economy sector composition, and monetary and fiscal policy responses.

For example, China has so far managed to contain the virus more quickly than the U.S. or Europe, and its economy has a smaller share dedicated to services, which rely more heavily on face-to-face interaction. It is therefore expected to recover to pre-virus levels more quickly.

In both the euro area and the U.K., the recovery is expected to take longer than in the U.S. because the initial shock to output is anticipated to be larger (primarily because containment measures put in place were more severe) and the policy response by monetary and fiscal authorities has been weaker.

Figure 3. Expected path of GDP across the U.S., the euro area, China, and the U.K.

Baseline forecast



Note: The charts show our expectation for the level of real GDP in each country in its local currency, which has been rebased to December 2019 = 100.

Source: Vanguard.

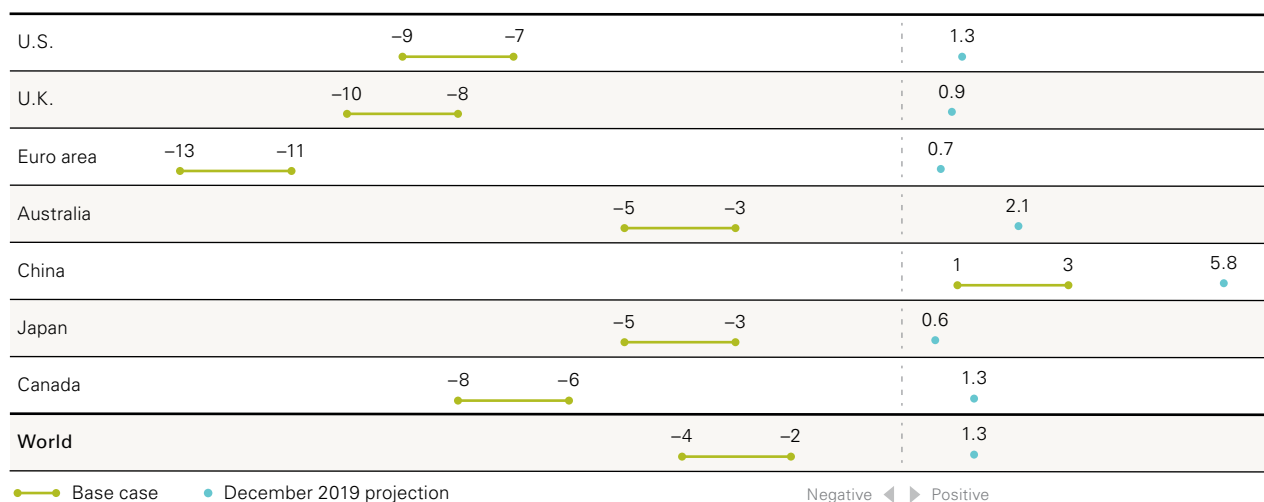
These forecasts represent our best-assessment, baseline expectation in what is a highly uncertain, rapidly evolving environment. In this baseline forecast, we assume a gradual, staggered reopening of the global economy with consumers eschewing high-risk sectors until the virus is contained, either through natural or medical developments.

Figure 4 shows our baseline 2020 GDP growth forecasts for the major regions we cover, and a comparison to our forecasts made at the start of the year in our [annual economic and market outlook](#). Alternative health outcomes represent upside and downside risks to our baseline forecasts.

In our downside scenario, recurring outbreaks force nationwide lockdowns to be implemented, causing output to be considerably lower and resulting in GDP taking a very long time to recover to pre-virus levels. In our upside scenario, a sooner-than-expected medical development, before year-end 2020, diminishes consumers' fears and allows face-to-face service industries a quicker return to the pre-virus normal.

As a result of this analysis, we expect a very deep contraction in global economic activity. However, the recession is anticipated to be relatively short as the most stringent containment measures ease. The subsequent recovery is likely to be slow and will vary substantially across different sectors and regions of the global economy.

Figure 4. Summary of 2020 global GDP growth forecasts (%)



Note: December 2019 projections are taken from *Vanguard Economic and Market Outlook for 2020: The New Age of Uncertainty*, Vanguard Investment Strategy Group, 2019.

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ISGECOV 062020