# COVID-19 AND ITS IMPACT ON BUSINESS R&D

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Measures to contain the spread of Covid-19 will lead to a deep recession in many countries in 2020. The economic slump will also affect the willingness of companies to invest in innovation and research and development (R&D) and thus long-term investments in the future. Innovative companies, however, are much more resistant to crises.

## Current economic development

Measures to contain the spread of the Covid-19 pathogen have brought the world economy to a standstill in many areas. After sharp decreases on the stock markets, we are receiving initial results from Asia on the negative effects of the pandemic on the real economy. Estimates show that Chinese gross domestic product (GDP) plunged by around 10-20 % in January and February 2020, which means that this time the crisis is much more severe than in 2008/09 (Economist, 19 March 2020). We also have to expect a deep recession for many European countries in 2020. In its Spring 2020 Economic Forecast published on May 6th, 2020, the European Commission expects GDP in the European Union to fall by -7.5% in 2020.

The economic recession triggered by Covid-19 will also negatively affect the willingness of companies to invest in research and development (R&D) and their ability to launch new products and services on the market. However, numerous studies show that R&D in particular is a key driver of economic growth and thus also of economic recovery after the Covid-19 crisis.

## Experience from previous crises

Experience with past crises shows that corporate R&D spending is generally pro-cyclical: Periods of slow GDP growth such as 1992/93, 2000/02 or 2008/09 were accompanied by stagnating or falling R&D expenditure in the business sector. This pattern can be observed in the US, Germany and Japan (Figure 1).

The pro-cyclical pattern can be explained by various factors (Barlevy 2007, Fabrizio and Tsolmon 2014): First, a lack of liquidity and restrictive bank lending hamper R&D activities of companies during recessions. As Figure 2 shows, small firms in particular suffer from liquidity and financing problems, while large firms have more internal resources and better access to credit markets. Even though the governments of several European countries have adopted state support programmes for companies, the current crisis will lead to liquidity shortages for companies via demand shortfalls. These shortages in turn will have a negative impact on the willingness to invest in R&D.

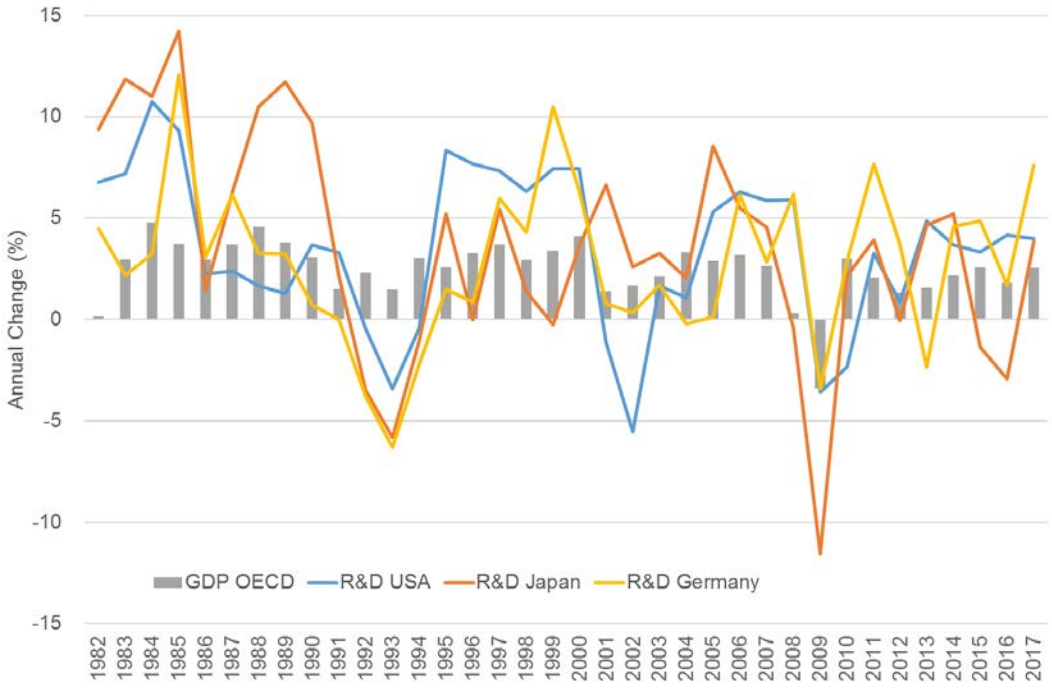


Figure 1: Annual growth rates of GDP and business R&D expenditure in the OECD, 1982-2017 at constant prices 2010, USD purchasing power parities

Note: The grey bars show the average annual growth rate of GDP in the OECD. while the three lines show the growth rate of R&D expenditure in the US, Japan and Germany.
Source: OECD. MSTI 2019/2.

Second, the recession is affecting innovation activities via demand expectations. Firms postpone innovation activities during a recession because demand conditions are too unfavourable and the returns from innovations appear higher in phases of stronger growth. Moreover, economic and political uncertainty in times of crisis reduces the willingness of companies to invest in R&D. In times of high uncertainty, companies that actually wanted to increase their R&D spending tend to postpone this spending until better times out of caution (Bloom 2009).

The impact of Covid-19 on innovation activities will therefore largely depend on how long the crisis lasts, when the uncertainty among firms weakens and growth expectations improve again. The financial and economic crisis of 2008/09 already started in 2007, but the biggest cuts were made in 2009, and a general recovery in R&D spending began in 2010. If we can overcome the crisis, the impact on R&D activities can be expected to be much smaller.

Highly internationalised companies were particularly affected by the financial and economic crisis of 2008/09 and their innovation activities suffered more than innovation on domestically orientated firms (Dachs and Peters, 2014). Paunov (2012) observes for a sample of firms from Latin American countries that companies supplying to multinational firms or suffering export shocks were more likely to reduce R&D spending.

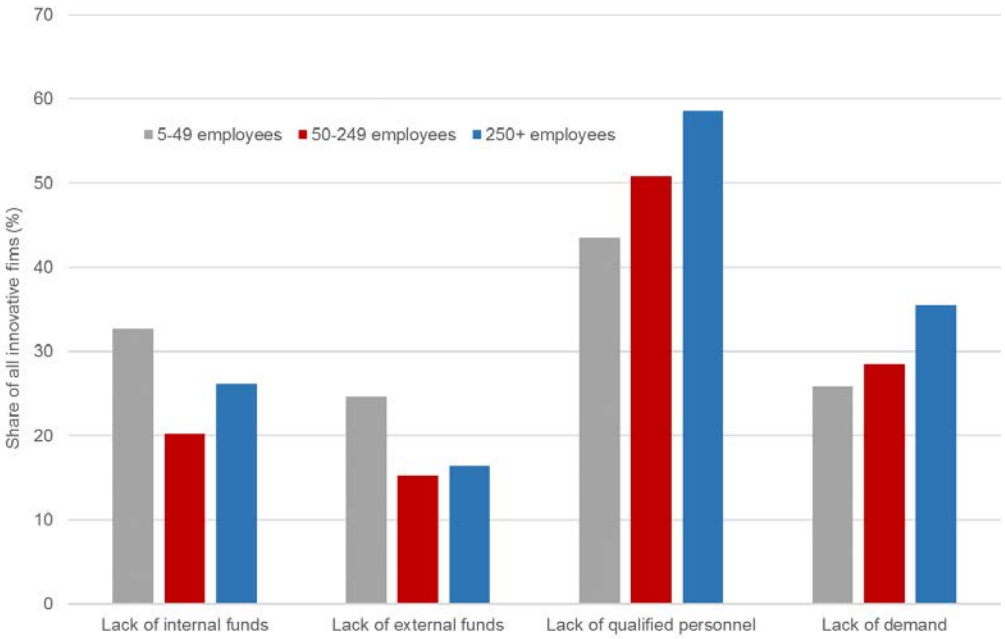


Figure 2: Obstacles in the innovation process of companies by size class in Germany, 2016-2018
Source: ZEW, Mannheim Innovation Panel, CIS 2016-2018

## A "creative response" to the crisis?

Schumpeter (1939, 1942) saw recessions as those periods when basic innovations lay the foundations for the next upswing. Innovation means to solve problems, and many companies are indeed forced by the crisis to develop new products, processes or business models. There were also numerous exceptions to the procyclical pattern of R&D spending during the financial crisis of 2008/09 (Archibugi et al. 2013). For example, about 34% of all German companies increased their innovation activities countercyclically during the (Rammer 2012). The EU Industrial R&D Investment Scoreboard, a collection of R&D expenditure data of the 2000 largest firms in the world, provides more examples for counter-cyclical R&D investments. One area where innovations may emerge in the current crisis are digital online offers and delivery services in retail and restaurants. The reactions to Covid-19 will also bring about innovations in other, unexpected areas. Companies that have already expanded their e-commerce skills before the crisis may have a clear advantage here. Moreover, the current crisis also lowers the opportunity costs of R&D and innovation activities in the form of lost profits, and may also relieve the pressing shortage of qualified personnel many innovative firms face (see Figure 2).
But even if the loss of many business activities creates free capacities for innovation and the opportunity costs of innovation are low, it is questionable whether firms can actually use these capacities in the "home office" caused by the virus. R&D is often tied to specific technical equipment such as laboratories or workshops and is a highly collaborative process that requires people to work together. Even if the crisis gives time for creativity, there may be a lack of means to translate this creativity into new products due to the restrictions of public life. Access to laboratories, equipment as well as cooperation partners at universities or in other companies is difficult. This makes the Covid 19 recession very different from previous crises, where these limitations did not exist. We may therefore see less anti-cyclical innovation behaviour than during the financial crisis of 2008/09.

## Long term effects

The innovative capacity of enterprises is the result of a long-term accumulation of knowledge and skills. Even if we can overcome the current crisis more quickly than expected, effects on innovation activities may occur years later. Rammer and Schubert (2018) show, for example, that small companies have less often reached a higher level of innovation after the 2008/09 crisis than before. Teplykh (2018) finds similar changes and interprets them as new barriers to entry for innovation as a result of an intensified competitive environment.
Another possible long-term constraint comes from public budgets, whose debt is rising significantly due to the Covid 19 crisis. Public R&D spending remained stable during the 2008/09 crisis, but many countries found it difficult to maintain their spending levels in the consolidation after 2011 (Izsak et al. 2013, Pellens et al. 2018). As a result, Veugelers (2014) and Pellens et al. (2018) observe a growing innovation gap between countries with high and low consolidation needs in Europe, with the first group not being among the "innovation leaders" in Europe even before the 2008/09 crisis.

## What can policy makers do?

The aim of research and innovation policy is to contribute to growth and job creation. To achieve this, it is necessary for companies to launch new products on the market, as this is the only way to compensate for losses resulting from the slump in demand for old products during a recession. As Figure 3 illustrates, innovative companies were much more resilient to the consequences of the economic and financial crisis of 2008/09 (Dachs et al. 2017).


Figure 3: Contribution of product innovation to employment change in Europe during recessions, 1998-2014

Reading aid: In years of recession, employment in companies fell by an average of 1.4%. While non-product innovators reduced their employment by 4.6% due to lower demand, the demand-induced reduction for product innovators was much lower at 0.7%. At the same time, companies were prepared to retain employees and thus accept a deterioration in productivity, which helped to safeguard employment by 4%.

Source: Dachs et al (2017). Data are based on the Community Innovation Surveys CIS3, CIS4, CIS2006, CIS2008, CIS2010, CIS2012 and CIS2014 for 26 European countries. Own presentation

Research and innovation policy during the crisis should therefore prevent companies from discontinuing their innovation activities. Direct and indirect financing instruments can help to overcome liquidity bottlenecks for innovation projects, especially in small and medium-sized enterprises, and stabilise future expectations. However, the fundamental problem for innovation activity in the current crisis seems to be the restrictions on economic activity.  If they disappear, additional financing could be necessary to prevent companies from permanently discontinuing their innovation activities. Such support should primarily benefit small and medium-sized enterprises.

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