Leopoldina
Nationale Akademie
der Wissenschaften

July 2021 | Statement

Economic consequences of the COVID-19 pandemic

Analysis and possible courses of action

Imprint

Publisher
German National Academy of Sciences Leopoldina
Deutsche Akademie der Naturforscher Leopoldina e. V.,
Jägerberg 1, 06108 Halle (Saale), Germany

Editors
Dr. Kathrin Happe, Johannes Mengel
German National Academy of Sciences Leopoldina
Contact: politikberatung@leopoldina.org

Translation
Peschel Communications GmbH, Freiburg

Design and typesetting
Klötzner Company Werbeagentur GmbH, Hamburg

DOI
https://doi.org/10.26164/leopoldina_03_00414

Bibliographic information published by the German National Library
The German National Library lists this publication in the German National Bibliography.
Detailed bibliographic data is available online at http://dnb.d-nb.de.

Recommended citation
National Academy of Sciences Leopoldina (2021): Economic consequences of the COVID-19 pandemic – analysis and possible courses of action. Halle (Saale).

Editorial deadline
July 2021

Economic consequences of the COVID-19 pandemic

Analysis and possible courses of action

Table of contents

Executive summary

The COVID-19 pandemic has brought about new medium- and long-term challenges that will need to be addressed by economic and social policy. It has also exposed problems that already existed. This statement presents a discussion of the economic consequences of the pandemic. Each of its four substantive sections starts out by providing an analysis of the status quo of a particular area, followed by suggestions for specific political courses of action. The statement was finalised in June 2021 and adopted by the Presidium of the National Academy of Sciences Leopoldina on 13 July 2021.

Following the introduction, chapter 2 of the statement addresses the ability to facilitate and manage the structural changes that have been intensified by the pandemic. The chapter then reflects upon the prerequisites for sustainable economic growth. The discussion centres around setting up infrastructure, offering fiscal incentives for investments and innovations, strengthening crisis resilience, boosting innovation activities, encouraging new businesses, and improving the strategic capabilities of Germany and the rest of Europe. Chapter 3 turns to the complex distributional challenges that have been exacerbated by the coronavirus pandemic. The main issues discussed here include potential fiscal responses to the pandemic, limiting inequality of education, developing further training opportunities, creating the framework for improved gender equality, and making amendments to social policy in relation to marginal employment, self-employment, and pensions.

The focus of chapter 4 is the performance of government organisations on the national and international level. Topics of debate include possible ways of improving crisis management, the distribution of duties and responsibilities within the federal system, the capacities of public authorities, the structure of the education system and of public health services, and international cooperation within the healthcare sector. This chapter proposes the establishment of an independent committee to consider evidence-based recommendations for fundamental reform once the worst of the crisis has passed. Chapter 5 considers the sustainability of public finances at different federal levels. The discussion centres around the development of the national debt, options for reforming the “debt brake” (“Schuldenbremse”, a constitutional rule to limit government borrowing) and challenges relating to municipal finance and European fiscal policy. Each chapter covers a number of options for policy level changes to be considered in the wake of the COVID-19 pandemic.

Owing to the complex nature of the issues being discussed, there may be some overlap between different sections of the statement. We present two of these issues here by way of example:

Fiscal measures will need to be selected carefully and public finances used wisely in the wake of the pandemic. This holds when the government is to provide infrastructure and offer incentives for investments and innovations (chapter 2.2) as part of the strategy to support the necessary economic recovery process. It equally holds, when the government counteracts shifts in the social balance brought about by the pandemic (chapter 3.1) and ensures the sustainability of public finances on a national and a European level (chapter 5).

Education should be accessible to all parts of the population if sustainable growth and structural change are to be facilitated (chapter 2.2). What's more, decisive action within the education sector is also an essential step in counteracting the long-term effects of the COVID-19 pandemic in terms of inequality and social disparities (chapter 3.2), in terms of distribution effects brought about by future structural change (chapter 3.3) as well as in terms of reinforcing and expanding the capacity of public institutions (text boxes in chapter 4 and chapter 4.2.4).

1 Introduction

1.1 Developments and measures up to spring 2021

The COVID-19 pandemic has overshadowed all aspects of society, politics, and economic growth across the globe since March 2020. We are constantly seeing regional outbreaks or peaks as well as troughs in infection rates. Vaccination, testing, and virus variants are the main topics driving the public debate. Governments across the globe have been forced to take drastic state-wide measures in the name of public health. At the same time, decisions have been made and implemented in order to cushion the economic impact and bridge financial gaps caused by the pandemic.

At the macroeconomic level, the COVID-19 pandemic has led to severe disruptions in supply and demand, a development which led to a global recession in most parts of the world in 2020. It looked as though the German economy would quickly recover and return to pre-pandemic conditions during the second half of 2020. However, the second and third waves of infections along with the emergence of virus variants and the slow progress of vaccination and testing programmes in the first quarter of 2021 led to more uncertainty surrounding the ongoing economic recovery and a less optimistic outlook. In response to the crisis, the German government quickly implemented substantial fiscal measures to protect the real economy from the fallout caused by the pandemic. Loan guarantees, moratoriums, and short-time work ("Kurzarbeit", the German paid, predominantly part-time furlough scheme) were some of the measures taken. To finance these measures, the "debt brake", enshrined in the constitution as the guiding fiscal rule, was suspended for 2020 and 2021, in accordance with its provisions for emergency situations.

The European Union has suspended the deficit rules under the Stability and Growth Pact for two years and is supporting member states' fiscal policy by setting up a recovery plan for Europe. The Eurosystem has provided liquidity to stabilise lending and financial markets. Within the scope of the existing supervisory regulations, banks were given some leeway for granting loans. On the whole, these measures can build on an institutional framework that is much further developed than at the time of the financial crisis.

Even though the last major financial crisis in 2008/09 has provided valuable insights, there are significant differences compared to the current situation. While the 2008/09 financial crisis was caused by structural problems within the financial services sector which ultimately affected the real economy, the current problems are the result of a pandemic that first and foremost affected the real economy, sending out shock waves that impacted many areas of society and the economy. The timeline of these events is also different. It is unclear if and when there will ever be time 'after' COVID-19. The COVID-19 pandemic has exposed specific structural weaknesses that were already there.

1.2 Consequences of the pandemic and long-term challenges

The pandemic and its effects will continue to linger into the future. Looking ahead to autumn 2021 and beyond, when it could well be possible to manage the pandemic thanks to the vaccination programme, the government will be faced with the task of setting out its long-term strategic plan. These challenges will have to be overcome at a time when Germany is facing structural changes resulting from shifting demographics, digitalisation, and ambitious climate change targets. Policies will need to be chosen against the backdrop of a complex situation brought about by the pandemic. It will likely remain difficult to estimate which costs associated with the crisis can be attributed to the government's response to the pandemic and which are the result of people's behavioural choices. Furthermore, reliable and objective metrics on the relative impact on individuals and specific groups of the population are not yet available.

At the same time, it has become more urgent to make progress toward European integration. During the pandemic, the importance of close cooperation among the European nations has become clear, along with the need for a functioning single market. Moreover, some challenges require a coordinated global response, such as containing climate change, bracing for new infectious diseases, and maintaining the international trading system. In addition to overcoming the immediate challenges, it is essential to be prepared for a wide array of consequences resulting from other potential crises, not only those caused by nature; in other words, resilience is necessary. The COVID-19 pandemic has likely exacerbated some of these challenges and yet made solving some of them easier.

This statement focuses on four overarching areas of concern. Chapter 2 presents a discussion of the effects of the pandemic on economic structural change and the necessary conditions to raise the economic growth potential from its current level going forward. Chapter 3 considers the possible short- and long-term consequences of the pandemic on wealth distribution and social inequality, outlining available policy responses relating to education and professional development, gender equality, and the structure of the social welfare system.

Chapter 4 addresses the limitations in the capacity of government organisations that have been exposed during the pandemic and suggests ways to identify their root causes and to potentially overcome them. Chapter 5 analyses the sustainability of public finances and discusses options for reforms relating to the national debt and the relevance of municipal finance and investment activities in the aftermath of the pandemic. Chapters 4 and 5 in particular present an international perspective and consider effects of the pandemic on the significance of borders, international trade and European institutions. Depending on the issue, the suggested policy measures should be coordinated with European partners or as part of a global effort.

1.3 Statement structure

Each chapter begins with an analysis of the situation as it stands and goes on to suggest political courses of action. The opening analysis includes problems that had already been identified before the COVID-19 pandemic but have received heightened attention as a result of the pandemic. Although scientific evidence is provided whenever possible throughout this statement, reliable empirical results were not always available as a basis for potential courses of action. The nature of many questions is novel and unprecedented. In these cases, this statement draws on experience from comparable contexts and conceptual considerations.

Particularly when it comes to assessing crisis management, the evidence-based approach reaches its limits. For that reason, its discussions are more anecdotal than the those relating to economic policy and developments under ‘normal’ circumstances. Notably, there is neither a real counterfactual situation nor is it possible to draw on the results of credible analogies from the management of other crises. Therefore, this statement does not aim to make harsh judgements on specific measures taken by the government. Rather, the intention is to present the areas in which public administration and politics have room for improvement going forward.

The working group is aware that it is not possible to make statements made on the basis of scientific knowledge with 100% certainty and that their line of reasoning can by its nature only be valid temporarily, especially since the factual basis for the problems constantly evolves and knowledge is often limited. With this statement, the working group sees its main responsibility in contributing to the ongoing discourse and opinion formation. With that in mind, value judgements are avoided where possible but disclosed where necessary, the context is explained, and potential courses of action are outlined.

2 Structural change and economic growth

Even if it is possible to successfully curb the public health consequences of the COVID-19 pandemic over the course of 2021, the pandemic will most likely continue to affect economic growth in Germany, even in the medium to long term. Changes brought about by the pandemic pose opportunities and challenges alike. For example, the expedited structural change – affecting digitalisation amongst other areas – could boost the productivity of businesses in the medium term. But this positive development, which unleashes huge potential for growth, is offset by negative effects on potential growth, most significantly weakened human capital in the future as a result of learning lost during the pandemic. Furthermore, it is anticipated that people will be even less likely to make risky financial moves like starting up their own company after living through the pandemic. Against this backdrop, this chapter sets out an analysis of the impact of the pandemic on economic structures and growth, before suggesting political courses of action aiming toward sustainable growth.

2.1 Analysis

Even before the start of the COVID-19 crisis, Germany was confronted with overcoming the challenge of major structural changes affecting its economy and society during the 2020s decade.[1] As the baby boomers born in the 1950s and 1960s start to retire, the declining workforce will continue to decline at a dramatic pace, likely exacerbating the labour shortage already being witnessed now. Structural changes are also high on the agenda in light of the requirements (set out in even more ambitious terms now by the European Green Deal) to reduce greenhouse gas emissions and shift the energy supply system toward climate neutrality.[2]

Even before the current pandemic it was unlikely to overcome these challenges without forfeiting some growth in prosperity. The German economy had been facing declining productivity growth for several decades and was at the end of a boom that had lasted for the past decade owing predominantly to large numbers of immigrants arriving from member states in Eastern Europe and a strong focus on the international division of labour. The need for major structural reforms, e.g., to boost Germany's international appeal as a location and to ensure the resilience of the social welfare systems with respect to demographic change, was already very clear.[3]

The pandemic has now provided its own impulses for structural change, with the ultimate impact on the future growth of the German economy still being uncertain. For example, the digitalisation of the economy progressed more quickly during 2020,

1 Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2019)b.

2 Cf. Nationale Akademie der Wissenschaften Leopoldina et al. (2020).

3 Cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2019)b, (2020).

affording much of the private sector more flexibility in its response to the challenges posed by the pandemic. These new and future technological opportunities open up the door to increased productivity growth as well as income gains and improved quality of life. These benefits can only be achieved if companies are keen to make complementary investments in process innovations, the development of new products and business models, and further training opportunities.[4]

Many companies likely do not have sufficient resources to make these kinds of investments right now, as they have used up their cash reserves and taken on more debt due to the pandemic. Up to spring 2021, the number of companies that exited the market due to bankruptcy was low, due in part to the fiscal measures in place and the suspension of the obligation to file for insolvency proceedings. If the number of bankruptcies increases considerably, this may put the banking sector under pressure and make it more difficult for companies to access borrowed capital.[5]

Significant changes in the real economy are also necessary in other economic areas due to shifts brought about by the pandemic. For example, although video conferences may not always be the perfect alternative to a business trip, the pandemic has shown that the difference does not always justify the higher costs associated with traveling. Therefore, it is expected that there will be a permanent drop in demand for transport and accommodation. Similarly, there may be much less demand for commercial properties in town and city centres in the future, whilst the local retail sector is facing increasing pressure to adapt in view of the increased reliance on online shopping and mail-order services.[6] These trends could change the face of Germany's towns and cities forever and call existing urban planning concepts into question.

In part, real economy structures also need to be adapted where the pandemic has uncovered areas in which economic activities are vulnerable and susceptible to disruptions. The high concentration of production and delivery routes for certain products that have largely been imported until now, such as face masks and pharmaceutical raw materials, has saved on costs but also led to a greater risk of disruption.[7] Companies and countries likely need to re-evaluate the benefits of efficiency in procurement against the reduction of risks through greater diversification.

4 Cf. Brynjolfsson et al. (2021).

5 Government support measures have counteracted some of the negative effects of the COVID-19 crisis on the liquidity of companies. The amount of debt within the corporate sector has shot up during the pandemic (cf. for example Banerjee et al. (2020) and Demmou et al. (2021)). Empirical evidence suggests that company debt has a negative impact on investments (cf. for example Barbiero et al. (2020) and Kalemli-Ozcan et al. (2019)).

6 Cf. Projektgruppe Gemeinschaftsdiagnose (2020).

7 Cf. Streibich & Lenarz (2021).

Economic prosperity is also influenced to a large extent by human capital within the economy and start-up dynamics, where challenges are also emerging as a result of changing views on self-employment and entrepreneurship due to the pandemic. It's no secret that businesses have been in real jeopardy during the pandemic, and therefore the pool of people willing to take a risk and set up their own company may have become even more limited than it already was.[8] Further, school closures during the lockdown periods may lead to future human capital being lost – if students are not able to catch up on the learning they have missed. This could mean another devastating blow for productivity growth (see chapter 3.2).

It is also important to bear in mind that the COVID-19 crisis has not affected all countries and economic areas to the same extent. In Germany, skills and social capital lay idle and was in part even devalued, requiring the education system and professional networks to rebuild and recover. In contrast, providers from other economic areas, particularly Asia but also other countries in Europe, have likely been able to get ahead of their competition.

2.2 Potential courses of action

When it comes to economic policy, it is essential to facilitate the imminent and major structural change toward more productive sectors with more productive companies and more productive business activities, and in some instances even to support it with targeted measures.[9] In terms of the social market economy, action must be taken to counteract the negative effects of structural changes on some people to ensure that they too have a positive outcome (see chapter 3.3).

Within the context of the COVID-19 crisis, it is also time to revisit the discussion on a strategic industrial policy in parallel with digital sovereignty. The primacy of multilateral agreements and political approaches was already being thrown into question before the pandemic by the US government under President Trump and by the People's Republic of China's claims to dominance.[10] Other countries were also discussing ways of strengthening their own capabilities in specific technologies and sectors. During the pandemic, a heightened vulnerability of national interests regarding the supply of vaccines and personal protective equipment (PPE) was evident, once again highlighting the need to discuss the purpose of national industrial policy.

8 Cf. Jiang & Sohail (2019); Kozeniauskas (2017); Salgado (2019).

9 Cf. Rodrik (2004); Stiglitz et al. (2013).

10 Cf. Bai et al. (2016); Wübbeke et al. (2016).

Resulting from these observations, two overarching areas of political action come to the fore. First of all, industrial, innovation, and fiscal policies need to be laid out to facilitate and support the structural changes that have become even more apparent in the wake of the pandemic. This is necessary to create growth that meets sustainability requirements and is driven by corporate action. In addition, with regard to government institutions and measures, it is necessary to clarify whether and how strategic capabilities can be strengthened at the national level. At the same time, they should be incorporated in an integrated European approach.

2.2.1 Facilitating and supporting structural change

Corporate activities that contribute to economic renewal include investments in physical capital, research and development as well as investments in entrepreneurial activities.[11] If more attention is to be focused on the private sector in the wake of the crisis than at its peak, it makes sense to create favourable conditions for corporate activities and dynamic structural change.[12] So as not to excessively impede structural change, supportive measures that were implemented during the peak of the pandemic should generally only be temporary, and larger government investments should also be reduced as soon as possible.

Providing efficient infrastructure

When it comes to increasing Germany's international appeal as a location for business, it is important to set up efficient, adequately digitalised administrative structures and processes, a range of high-performing research institutions covering everything from basic to applied research, and high-quality infrastructure for economic activities, in particular transport infrastructure. Most importantly, digital infrastructure must be expanded, as it provides the foundation for commercial production and promotes digitalisation within the private sector. The country and its federal states must confront the need for a sustainable strategy for upgrading, expanding and adding to existing infrastructure in a variety of areas (see chapter 5.3). At the European level, it is a matter of real urgency to create a functioning digital single market.[13]

---

11 Cf. Cimoli et al. (2008); Greenwald & Stiglitz (2013); Stiglitz et al. (2013).

12 Cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2019)b.

13 Refer to the European Commission's plans to strengthen the single market for digital goods and services in Europe. https://eur-lex.europa.eu/legal-content/DE/TXT/HTML/?uri=CELEX:52015DC0192&from=DE (Accessed: 12 June 2021).

Structural change cannot be implemented if the population is not equipped to deal with it. Ensuring that everyone is ready to adapt will also minimise social costs and encourage the acceptance of changes within the society.[14] As a result, there are high demands on early academic and vocational education and on professional development, particularly in regard to digitalisation. It is not only important to provide the necessary digital tools but also to find ways to encourage their effective use.

The school closures aimed at stopping the spread of the virus caused most pupils to miss more than half a school year, with children and adolescents from disadvantaged backgrounds being most affected (see chapters 4.1.3, 4.2.4). This has led to significant learning gaps in the next generation of the workforce. Weaker skill sets give rise to reduced productivity and less innovation, which will only add to the growth-inhibiting effects of the demographic shift. If this generation is not able to close these educational gaps, the future may hold considerable declines in growth and significant social disparities.[15]

Fiscal incentives for investment and innovation

Fiscal policy has a major impact on economic activity. The measures employed – and how they compare with the measures employed globally – determine capital investments, productivity, employment, and income distribution in Germany. Given that many structurally sound companies do not have liquidity buffers due to the COVID-19 crisis and the amount of debt has seen a sharp increase, fiscal policy measures aimed at increasing liquidity would be most helpful in expanding the scope of investments for structural changes in the current situation. This would especially be the case for small and medium-sized enterprises. A good place to start would be to adjust options for offsetting losses as well as modifying the tax base and taxation rates.

Improvements in terms of offsetting losses can create liquidity and help companies settle their debts quickly after the crisis. During the financial crisis, extending tax loss carry back provisions – that is, the opportunity to offset losses resulting from the crisis against profits from previous tax years – kept many companies in business.[16] However, since restrictive measures on carry backs remain in place, it would also be meaningful to consider temporarily suspending the minimum tax.[17] This latter measure would al-

14 Cf. Bloom et al. (2019).

15 Cf. Hanushek & Wößmann (2020).

16 Cf. Devereux et al. (2020). In the second and third Coronavirus Tax Assistance Acts, the amount of carry back permitted was increased. The regulations are still relatively restrictive, however, due to the fact that carry backs can only be applied to the previous tax year.

17 Cf. Koch & Langenmayr (2020). Suspending the minimum tax would shift the tax base in the future. Given the low interest rates at the moment, this would not put too much extra strain on the public budget. Suspending the minimum tax *for a limited time* would also limit the potential for abusing the system. For more on this, see Hey (2011) and others.

low companies to lower their tax burden sooner and to a greater extent using losses suffered during the crisis as soon as they begin making a profit again. The regulations on the expiration of loss carry forwards for acquisitions should also be evaluated more carefully, especially since they can make it harder for start-ups to access venture capital.[18]

Another way to stimulate structural investment in a targeted way would be to extend tax depreciation allowances for fixed assets. Evidence has shown that this allows companies to considerably expand their capital investments and offer more employment opportunities.[19] As small and medium-sized enterprises tend to respond well, tendencies towards market concentration could be counteracted. Furthermore, this measure would only benefit companies that actually invested. It would predominantly support companies that have been negatively impacted by the COVID-19 crisis, have little liquidity and would otherwise find it very difficult or expensive to finance new investment projects externally owing to increases in debt. Given the current low interest rates, this would be a cost-effective measure for the government. Tax payments would simply be postponed until a future date. Considering that the tendency to invest and the effects of fiscal incentives are reduced during times of crisis, there are strong arguments in favour of providing strong incentives.[20]

With respect to international tax competition extended depreciation allowances could also render Germany more attractive as a business location.21 Before the pandemic, Germany had become considerably less attractive in terms of business taxation. Other measures – especially decreasing the corporation tax rate – would also have a positive effect but would be more expensive in fiscal terms. Compared to other countries, Germany has one of the highest tax rates on profits for incorporated businesses.[22] Reducing the corporate tax rate could, most importantly, encourage highly profitable investment projects, which often have positive effects at the local level, such as creating well-paid

18 Cf. Bührle (2021).

19 Cf. Banerjee et al. (2020); Garrett et al. (2020); Maffini et al. (2019); Zwick & Mahon (2017).

20 Cf. Guceri & Albinowski (2019).

21 Cf. Feld & Heckemeyer (2011).

22 Taking the national and municipal level into consideration, the effective corporation tax rate is over 30% in Germany (cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2018), Chapter 6). Germany still has one of the highest corporation tax rates in the world, despite the recent announcements to increase corporation tax rates in the UK and plans by the Biden administration to raise rates in the USA. Corporate taxes generate stronger inefficiencies than other types of taxes. This means that it is possible to boost economic growth by lowering corporate taxes while also increasing other taxes that do not have such a strong effect (see, for example, OECD (2010)).

jobs and boosting productivity at local companies through knowledge transfer.[23] This would also help reduce the risk of losing the tax base to other countries with lower rates of taxation.[24]

Increasing tax incentives for research and development (R&D) is another option worth considering. Often, companies are only able to unleash new productivity potential in connection with their own R&D projects. Specific tax support for R&D activities could encourage companies to increase their efforts in this area and also lead to agile international R&D activities within multinational corporations.[25] In recent decades, a number of countries have started to offer substantial research funding through the tax system by means of tax credits for research and development activities or generous depreciation provisions against the tax base.

Germany has only recently introduced a measure in this vein with its research allowance. This is provided in addition to project-based government R&D funding and particularly benefits small and medium-sized enterprises. Especially when companies lack the internal resources or the ability to take on additional debt, this measure helps them to carry out R&D activities. The administrative costs are relatively low and the provisions provide a more reliable basis for planning than R&D funding offered on a project-by-project basis.

In its current form, however, the research allowance is relatively restrictive when compared internationally. Particularly for small and medium-sized enterprises, it could be beneficial to expand this allowance as a way of encouraging more investment in R&D and counteracting increasing market concentration.[26] Empirical evidence suggests that tax incentives for R&D are highly effective. It is challenging to structure them in such a way that free-rider effects are limited which result if companies repurpose other activities as R&D.[27]

---

23 Cf. Devereux et al. (2020) and Wissenschaftlicher Beirat beim Bundesministerium der Finanzen (2019). It is not yet clear how the COVID-19 crisis will influence the global mobility of companies and capital, if at all. One scenario suggests that the pandemic could reduce international capital mobility and in turn weaken global tax competition. The vulnerabilities in supply chains exposed by the pandemic could cause companies to be more strategic with their investments in future, with less of a focus on fiscal considerations. Opposite effects are also possible, however. After all, the pandemic reinforced the importance of digital business models and value chains, which generally increase capital mobility and opportunities for international tax optimisation.

24 Cf. Dharmapala (2014), for example.

25 Cf. Guceri & Liu (2019); Knoll et al. (2019).

26 Cf. Expertenkommission Forschung und Innovation (2020).

27 Cf. Bloom et al. (2019) for an overview of the literature. Recent studies show that tax incentives for R&D activities can actually sometimes incite opportunistic behaviour. In other words, companies may repurpose other activities as R&D to gain tax benefits. Evidence does show, however, that reducing the tax payable on R&D investments does significantly boost R&D activities and productivity within businesses (cf. Akcigit et al. (2018); Bloom et al. (2002); Dechezleprêtre et al. (2016); Curtis et al. (2018); Chen et al. (2018); Bøler et al. (2015)).

Strengthening crisis resilience

The COVID-19 pandemic has shown the extreme vulnerability that can arise due to specialised supply chains. For this reason, many companies are now looking at their buying processes in light of potential future pandemics that may disrupt supply chains again. This involves careful consideration of the conflict between procuring inputs at the best price and ensuring a secure supply.

While it is possible to build resilience to international trade frictions by diversifying trade chains, this cannot perfectly safeguard supply chains, e.g., in a global pandemic. Partial or even full renationalisation of production may lead to an increased security of supply but it also comes with higher costs because the international division of labour is not being utilised. Even if companies are generally called to make their own decisions, the public interest in a guaranteed security of supply sometimes outweighs the private interests of the companies in certain sectors, for instance when it comes to the supply of medical resources. State intervention could be required here – ideally coordinated at the European level.

The pandemic has also impaired the overall crisis resilience of companies whose equity dwindled during this time. First and foremost, business owners are responsible for remedying this situation. State intervention is only justified when private sector investments in crisis resilience remain below a level that optimally meets the needs of society. This suggests (again) that the existing tax advantages associated with debt financing impede an increase in equity ratios, which needs to be more critically evaluated.[28]

Increasing innovation

Activities relating to research and innovation have a huge impact on structural change and economic growth because of their positive external effects.[29] Considering this, state funding should be provided for private innovation efforts and knowledge transfer.[30] During the COVID-19 pandemic, state-funded basic research was proven to be an important condition for the rapid development of vaccines. Yet frictions regarding funding and important framework conditions, such as authorisation, have inhibited the use of this potential until now, particularly in the life sciences and biotechnology sectors. It should be assessed whether changes to the patent system or state patent acquisitions may be required with a view to preparing better for another pandemic.[31]

28 Cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2015), Chapter 8.

29 Cf. Bloom et al. (2013); García-Manjón & Romero-Merino (2012); Lucking et al. (2018).

30 Cf. Hausmann & Rodrik (2003); Rodrik (2008).

31 Cf. Kremer (1998).

If innovation policy were to take a horizontal approach, interventions would not favour any specific technologies, companies or sectors. This would give rise to opportunities for unexpected technological progress and structural changes supporting growth. This policy approach would also reduce the risk of state intervention being abused in favour of individual interests or, often in close connection, to consolidate the status quo.[32]

In regard to specific sectors or technologies where individual interventions in the economic structure or innovation activities appear to be justified, the government must exercise particular caution. Any such intervention should ideally follow strict criteria, and the allocation of funding should take place on a competitive basis. The use of funding should be monitored throughout, and the impact of the measure should be evaluated ex post.[33]

The energy transition provides a good example of the benefits of a broader approach as opposed to narrower attempts on the part of the government to exert control. The introduction of uniform carbon pricing as a key instrument for the European energy transition could greatly increase efficiency potential and also encourage research into better technological solutions. That is why the academies of science recently suggested that Germany should strongly advocate for uniform carbon pricing to be set swiftly across sectors, technologies and member states in Europe. This could reduce the costs associated with transforming the energy system, whilst improving the reliability of climate policy frameworks which is necessary for investments.[34]

Encouraging entrepreneurial activities

Start-ups are an important source of new products, services, and business models.[35] As these start-ups generally pursue new directions, it is difficult to say with certainty what their profitability and growth prospects might be. Faced with disparate national regulations across Europe, many new companies tend to choose the USA or Asia as the springboard for their international expansion. Moreover, high-tech start-ups to start often take much longer than traditional venture capital business models to begin turning a profit. Findings from behavioural economics also suggest that suitable role models are crucial to instigate entrepreneurial activity.

32 Cf. Jones (2016); Riess & Välilä (2006).

33 Cf. Baldwin & Robert-Nicoud (2007).

34 Cf. Nationale Akademie der Wissenschaften Leopoldina (2019); Nationale Akademie der Wissenschaften Leopoldina et al. (2020); Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2019)a.

35 Cf. Atkeson & Kehoe (2007); Decker et al. (2014); Dent et al. (2016).

If newly formed companies were provided better access to growth capital, it would likely have a positive impact on start-up culture. This could prevent the phenomenon of many knowledgeable, high-tech companies formed in Germany and the rest of Europe ultimately entering foreign stock exchanges. If more companies were to go public in Germany, the country would likely attract more venture capital investments, as this would provide an attractive exit strategy for venture capital funds.

In an attempt to better mobilise the venture capital scene on the whole in Germany, restrictions on investments could be eased for financial intermediaries, existing government support schemes could be increased and the associated processes could be streamlined, and alternative measures beyond venture capital models could be introduced for external and internal financing and coordinating potential investors.[36]

2.2.2 Improving the ability to take strategic action

The COVID-19 pandemic has led to a reiteration of recent calls to strengthen efforts toward technical sovereignty and the implementation of strategic industrial policy. These topics did not receive much attention in previous decades since free trade has been largely secured within the World Trade Organization (WTO) system, with breaches against the WTO rules being sanctioned fairly effectively despite long delays. Within the EU, state aid schemes limited national measures being taken in favour of a state's own market players. Even before the COVID-19 pandemic, the discussion on the combination of economic and geopolitical interests had come to a head, and will likely intensify even further over the coming years.

This is due in part to the most recent five-year plan put forward by the People's Republic of China, which sets out goals to dominate all relevant areas of science and technology. In the USA – even after the most recent change of government – state measures have been introduced to enable the production of semiconductors (3 nm and 5 nm process) and 5G technology for telecommunications at domestic sites. This approach is not only aimed toward Chinese suppliers like Huawei but also intends to create independence from European manufacturers like Ericsson and Nokia. When it comes to new technology trends like quantum computing, artificial intelligence, blockchain and cloud architecture, the world's largest economies are also developing plans centred around improving their own technological prowess and strengthening their local supply chains.

The European Union needs to formulate new responses to these developments, as omitting them from important discussions surrounding strategy could put Europe's

36 Cf. Achleitner et al. (2019); Akcigit et al. (2019); Bertoni et al. (2015), (2019); Colombo et al. (2016); Expertenkommission Forschung und Innovation (2019); B. Hall & Lerner (2010); Kortum & Lerner (2000).

economic and social interests at serious risk.[37] It could be equally problematic if policy makers identified these areas for action but would then commit to a level of intervention or an agenda that they may not be equipped to accomplish successfully. A government that is increasingly required to be clever in its consideration of strategic issues must first and foremost be able to identify those strategic issues and differentiate them from others. New technologies and innovative sectors have strategic relevance predominantly in light of the way in which they complement other areas of the economy and exhibit tendencies toward concentration of market power. One example is the development and rollout of effective COVID-19 vaccines.

Government interventions and plans in strategically important areas stand in opposition to the market-based international division of labour. Equally, it would be naive to leave these actions out of considerations relating to economic and security policy. Not being present and active in key industries could make Europe susceptible to blackmail on an international level. That is why it makes sense to discuss targeted interventions and corresponding proactive options for action. It is important to ensure that ideas aimed toward a strategic industrial policy at the national level are incorporated into a European strategy. The notion that Germany could create new industries with high added value solely on the basis of its own strength as a nation is unrealistic.

Given that strategic measures and policies can come with high consequential costs, it is important that they are used in a targeted and cautious manner. Between setting policy goals and successfully implementing them, a phase of careful, competent planning and analysis is required. Due to the complexity of the technological and scientific developments in question, this stage relies on political players' ability to act strategically and effectively. Ultimately, the responsible departments also need to be given the tools to implement plans of this calibre swiftly.

In the USA and the People's Republic of China, the government often cooperates with organisations that have long-standing expertise in the relevant area. Europe, in contrast, often lacks the necessary skills and knowledge required for strategic analysis and policy making. At times, the available information is also distorted by strong individual interests. For example, in the field of quantum technology, stakeholders in the fields of science and economy and the relevant federal government departments have not yet been able to formulate a common strategy. With advice from an independent body with the relevant expertise, it would have been easier to make policy decisions in this field or even possible to improve the quality of the measures passed.

37 Cf. Bundesministerium für Wirtschaft und Energie (2019); Mazzucato (2015), (2018)a, (2018)b; Melitz (2005).

With this in mind, an important goal for German and European industrial policy over the coming years should likely involve the creation of an effective network of independent specialist institutions that can be tasked with assessing significant new technological developments on the basis of the latest scientific knowledge and offering a forward-looking perspective on strategically important fields of technology and innovation. The idea of setting up new departments like the Office of Technology Assessment (OTA) or the Defense Advanced Research Projects Agency (DARPA) in the USA should also be considered. As the current critical discussions surrounding the recently founded (in Autumn 2019) German Federal Agency for Disruptive Innovation (SPRIND) reveal, new approaches will only be able to bear fruit if the funding of promising projects makes sufficient allowances for taking risks.

3 Distribution and inequality

The COVID-19 pandemic and the measures taken to curb the spread of the virus have had a serious impact on the economy and the job market. Many households suddenly had to deal with the fallout of lost income. Additional strain was placed on many 'essential' professions, such as those in nursing and childcare facilities. Many families had to take on new childcare responsibilities at home. Whilst the social welfare systems limited the loss of income in many cases, the pandemic has exposed the shortcomings of those very systems. It is important to mention that, in comparison, some groups have been less impacted by the pandemic, including people who have been able to work from home as well as those who do not have children to look after and those working in a sector less seriously affected by the pandemic (e.g. the public sector).

In addition to short-term effects, the pandemic may have long-term repercussions on the level and distribution of income in Germany. This will mainly come down to the disparate impacts of the pandemic on the educational sector. The repeated reliance on distance learning has contributed to a loss of learning and in turn reduced the earning potential of an entire generation of young people, particularly for lower-achieving pupils and those from disadvantaged educational backgrounds. On top of loss of learning, there is an increased risk of school dropout and life-long effects that may be seen by those who enter the job market in the midst of an economic crisis.[38]

Similarly, structural changes expedited by the pandemic could have different effects on job opportunities for those already in the workforce, depending on their sector and level of qualification. It can be assumed that inequality will be exacerbated more dramatically if the advantages of the technological transition are reaped predominantly by those with the highest qualifications, as has been the case in the past.[39] Lastly, the existing gender inequality in the opportunities for employment could become even worse. With this in mind, this chapter sets out the possible distributional impact of the pandemic based on observations to date and puts forward potential political courses of action in response.[40]

3.1 Cushioning the short-term distributional effects of the pandemic

The COVID-19 crisis has had a heterogeneous impact on the gross earnings of groups of the population, following unusual categorical distinctions. Some sectors have suffered extreme losses in profit and income owing to contact restrictions and social distancing measures imposed by the government and changes in consumer behaviour, with the

38 There is plenty of empirical evidence for the long-term 'scarring effects' associated with entering the job market during challenging economic periods (cf. for example Brunner & Kuhn (2014) and Oreopoulos et al. (2012)).

39 Cf. Dustmann et al. (2009); McAdam & Willman (2018) and the literature cited therein.

40 A detailed presentation of empirical information on the effects of the COVID-19 pandemic can be found in Stantcheva (2021).

hospitality and restaurant industry and cultural sectors being amongst the worst hit. By comparison, other areas of the economy have escaped largely unscathed and some have even profited from the situation, including delivery companies and online retailers. Most notably, employees in the public sector have not experienced any income loss due to the crisis.

Initial studies show that market income has dropped noticeably across the board on average, but households with lower incomes have been disproportionately affected by the pandemic. The short-term effects have also shifted over time. For example, more people with lower incomes were affected by unemployment in Spring 2020, whilst more high-income workers faced job loss in Summer and Autumn 2020.[41]

The additional non-monetary consequences of the pandemic were not felt evenly either. The health of some groups of the population has been at greater risk, including those working in healthcare, nursing care and childcare in particular. Some workers found themselves under greater pressure at work than others due to the pandemic. Families were forced to struggle with childcare at home during the pandemic. Further, the psychological stress caused by the lockdown and social distancing measures did not affect everyone equally.

Changes to gross income were offset in part through the tax system and government transfer payments. Employees who were making mandatory social welfare contributions were in part compensated with unemployment benefits and short-time work pay. The short-time work scheme was expanded during the pandemic and the application process was made easier. Families' income was supplemented through a one-off bonus for those already receiving children's allowance. Business owners were offered support from the government in the form of temporary and immediate aid, loans, guarantees as well as tax breaks and deferrals. The short-time work scheme also helped businesses to avoid costs associated with the dismissal and recruitment of employees. Despite all of these support measures, there were shortcomings and delays, especially felt by the self-employed and anyone waiting for the November support payout. Those who have profited from the pandemic ultimately pay a disproportionately high amount of tax, whilst those who have been disadvantaged the most also pay less tax accordingly.

It is still not clear how inequality in terms of net household income has developed in the pandemic. Initial studies suggest that, at least at the early stages of the pandemic, government transfer payments kept things well balanced. In other words, inequality in terms of net disposable household income did not increase significantly during the

41 Cf. Bach et al. (2020); Beznoska et al. (2020); Bruckmeier et al. (2020); Kohlrausch et al. (2020); Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2020).

pandemic. Other studies point to a slight increase in inequality.[42] Currently, no data is available regarding the effect of the pandemic on the distribution of wealth.

Potential courses of action

When suggesting potential political courses of action relating to distribution, the difficulty lies in the fact that the short- and long-term effects of the pandemic on distribution are not yet known and that responses in this area depend on value judgements. There are various possible routes the government could take in its response. The first option would be to change the social welfare systems to ensure that groups of the population who have been less protected until now could be better taken care of during a crisis. Another option would be to identify the mechanisms causing the serious impact on those groups most affected by the pandemic with a view to taking precautions to stop the same thing happening again. Finally, it is necessary to respond to the long-term effects of the pandemic on distribution.

People on different sides of the public discussion are calling for changes to be made to the tax system to close the gap between those who were most and least affected by the pandemic – beyond the measures that have already been taken. If the government were to consider this course of action, the challenge would be identifying those who were most and least affected. The impact of the pandemic – in financial and non-financial terms – does not follow a clear path. Instead, it varies within industries as well as income and wealth brackets.

Changes to taxes based on income or wealth would not provide a targeted means of closing the gap between those who came out of the pandemic in the best and worst positions. Even a tax basis that takes into account changes in income between 2019 and the COVID-19 crisis years would, at best, only partially solve this problem since income does not generally remain stable over time – let alone during a pandemic. Further, many non-monetary burdens do not necessarily correlate with changes to income. Regardless of any redistribution between those who came out of the pandemic in the best and worst positions, the ability-to-pay principle of taxation would mean that households with higher incomes would make a bigger contribution to covering the costs of the pandemic than households with lower incomes.

Rather than creating special COVID-19 taxes for a set period of time, it would also be possible to make use of the future tax progression by using loan financing to cover the costs of the pandemic. As outlined in chapter 5, the current level of public debt and low interest rates at the moment allow for some of the tax burden to be shifted to the

42 Cf. Bach et al. (2020); Beznoska et al. (2020); Bruckmeier et al. (2020); Kohlrausch et al. (2020); Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2020).

future. This could have a positive impact on the economic recovery in the wake of the COVID-19 pandemic and in turn on government tax revenue. If tax burdens were to be spread out over time, generally undesirable changes to behaviour in response to a tax increase could be kept to a minimum. In other words, reticence towards making investments and associated deadweight losses could be avoided.

3.2 Preventing greater educational inequality

Many inequalities come down to educational background. Children and adolescents from disadvantaged households rely on suitable schools and their unique support mechanisms to provide them with equal access to opportunities. The important benefits of those very schools and support mechanisms across the country were put on hold for extended periods during the COVID-19 pandemic (see chapter 4 for a discussion of the performance of the education system). Children and adolescents from disadvantaged socioeconomic backgrounds and lower-performing pupils have been most seriously impacted by the pandemic.[43] The mental and physical health of children and adolescents has suffered and the existing inequalities in skill development have been exacerbated.[44] Opportunities are now even less equal than before the outbreak of the pandemic.

This will have serious economic repercussions in the long term. If action is not taken, learning losses equating to a third of an academic year will result in a decrease of around 3% in earned income on average during a person's career.[45] There is also the risk that a lack of equal opportunities could have a negative impact on economic growth.

Potential courses of action

In its fifth ad hoc statement in August 2020, the Leopoldina put forward a number of measures that could be taken to reduce deficits caused by the COVID-19 pandemic within the child care and education sector.[46] Those measures included keeping schools and child care facilities open for as long as possible during the pandemic, combining face-to-face and distance learning, and encouraging closer cooperation between these institutions and families.

43 Cf. Agostinelli et al. (2020); Andrew et al. (2020); Bacher-Hicks, Goodman and Mulhern (2021); Chetty et al. (2020); Engzell, Frey and Verhagen (2020); Grewenig et al. (2020); Maldonado and De Witte (2020).

44 Cf. Nationale Akademie der Wissenschaften Leopoldina (2021); Wößmann et al. (2021).

45 Cf. Hanushek and Wößmann (2020).

46 Cf. Nationale Akademie der Wissenschaften (2020)b.

Following this approach, in the event of future school closures, mandatory online lessons via video conferencing would be provided for all pupils every day. Teachers would follow set lesson plans, which would allow for periods of self-directed learning to consolidate the content covered in online lessons. It would also be important to carry on with the usual test and examination procedures – even when relying on distance learning – as a way of keeping children and adolescents motivated.

The measures implemented to ensure that lessons and support mechanisms are running smoothly should focus more closely on providing additional support for children and adolescents who are from socially disadvantaged backgrounds and who are lagging behind their peers. It is necessary to ensure that they have access to the relevant technology. The parents and families of these pupils require special assistance, for example through home visits or support in multiple languages. It can be useful for school authorities as well as social and child welfare services to combine their efforts to reach children and adolescents from socially disadvantaged backgrounds.[47]

It will take time to compensate fully for pandemic-driven disadvantages to the academic success of the most seriously affected pupils and students and to allow them to catch up with their peers since the effects of academic success are in fact amplified over the course of a lifetime.[48] Presumably, it would make sense for some pupils to repeat the entire school year in order to have the chance to catch up on material and find their bearings.

If rising inequality in education is to be limited in the long term and pupils are to catch up on the lost learning, extensive support measures must be viewed as an absolute priority for pupils with weak academic records and from disadvantaged educational backgrounds. In order to offer afternoon catch-up lessons at schools and summer school programmes, student teachers could be brought on board temporarily, for example. Particularly additional one-to-one extracurricular activities, such as tutoring and support provided by student mentors, could well help motivate pupils who have fallen behind and get them excited about learning again. The benefits would likely be most significant if the programme focused on fundamentals such as preparatory maths and language skills. In the coming years, it also makes sense to centre educational curricula and syllabuses around these fundamental skills.[49]

47 Cf. Cremer (2021).

48 For more on the topic of dynamic complementarities cf. Cunha & Heckman (2007) and for their effect in the context of the school closures during the COVID-19 pandemic cf. Fuchs-Schündeln et al. (2020).

49 Cf. also Nationale Akademie der Wissenschaften Leopoldina (2021); Ständige wissenschaftliche Kommission der KMK (StäwiKo) (2021).

Investments in adaptive learning software and the required digital devices could also prove invaluable when it comes to offering individual support. Such efforts would require a large sum of additional government education funding for staff and resources, but the costs would be more than covered by the future increase in income if the measures are successful in significantly mitigating the impact of the loss of learning. As outlined in more detail in chapter 4.2.4 on the performance of the school system, additional funding would need to be combined with major structural reforms and clear political direction to ensure that it is put to effective use.

3.3 Counteracting distribution effects brought about by rapid structural change

In many areas of economic activity and employment, the COVID-19 pandemic has sped up the process of structural change (see chapter 2). Many companies have upped their investments in digitalisation and adapted their value creation processes during this time. It is also unlikely that retailers based in physical shops, businesses in the cultural sector and companies offering any services relating to business travel will be able to pick up exactly where they left off when the pandemic hit. As a result of this structural change, workers have been redistributed across sectors and working conditions have also been transformed.

In addition to providing income security, the government generally takes on the responsibility to qualify those for new employment who lost their position as a result of structural changes. In other words, all jobseekers have access to further training opportunities as a basic principle. On the contrary, for currently employed members of the workforce, further training is generally offered through their employer, who clearly has an interest in well-trained employees.[50] Still, not all employees are offered equal access to further training opportunities.

Empirical evidence suggests that less-qualified workers who perform routine tasks are less likely to participate in further training programs even though digitalisation has put their positions at particular risk.[51] Within the context of structural change, it should be deemed a priority for such workers to train for new positions in different sectors and take advantage of the benefits of quickly progressing technological developments relating to digitalisation, automation, robotics and artificial intelligence.

50 Cf. Ruhose et al. (2019).

51 Cf. Heß et al. (2019); Schwerdt et al. (2012).

Potential courses of action

Against this backdrop, the statutory provisions for state funding offered for further training were recently expanded and a national continuing education strategy was passed. In the wake of the upheavals caused by the COVID-19 pandemic, the existing funding formats need to be extended to allow more people to take advantage of the further training measures on offer. Improving the conditions for access as well as information campaigns and incentives to encourage employers to allow time for their employees to pursue further training should all be considered as priorities. There is also room to improve and extend the national continuing education strategy with a view to breaking down barriers stopping people from accessing further training, creating transparent structures, ensuring professional instructors, standardising skill sets, and making these standards available.[52]

A second approach would involve systematically linking further training to the short-time work scheme. Various studies suggest that a push for further training played an important part in the strong recovery response after the 2008/2009 financial crisis.[53] As a third option, incorporating access to further training and more effectively funding it as part of the short-time work scheme through collective labour agreements could allow employees better access to further training and continuing education.

As a final point, Germany lacks the structures to easily enable employees to access further training opportunities voluntarily. Modular, certified training programmes would be helpful here, as has been seen in the dual vocational training system. Online or hybrid options could make training opportunities more accessible. Certificates could be a way of providing employers with clear and reliable proof of the skills acquired, which would encourage employees to invest in this kind of training. It would also be worth considering the merits of setting up a support system for those in the workforce who decide over the course of their career (around the ages of 35 to 55) to change directions and need to complete further training or even an entirely new degree programme. With a view to offering further training that would be taken up by less-qualified people, it is necessary to consider the obstacles currently faced by this group of the population and the ways in which those obstacles could be overcome.

A system of lifelong learning along these lines could be based on the dual vocational training system. Businesses, employee representation groups and government authorities could all be involved in creating such a system. An expert committee or a round table discussion with partners from the social sector, politicians, training providers,

52 Heinrich-Böll-Stiftung (2020) and Heß et al. (2019) offer further discussions on this topic.

53 Cf. Hutter & Weber (2020); Weber (2020).

and researchers could deliver helpful recommendations for ways in which to set up a system of this nature. The ultimate goal would be to offer modular training that is tailored to the learning needs and capabilities of the relevant age group. This would provide a way of achieving a training certificate that sends a clear signal to employers and meets the needs of the current job market.

3.4 Counteracting setbacks in gender equality

Whilst the labour force participation rate for women in Germany has significantly increased over the past few decades, there are (and indeed there were before the pandemic) considerable differences in employment behaviour and income between men and women. Women take on more responsibility for unpaid housework and family care and are more likely than men to work part time. Also, substantial differences remain in wages between men and women (i.e. gender pay gap).[54] Research shows that social norms and insufficient frameworks, especially a lack of adequate childcare options, are the main forces behind the gender differences in employment.[55]

Many of these gender divides have been brought to the fore during the pandemic. As measures were rolled out in an attempt to control the virus, mothers found themselves bearing the brunt of the challenging childcare situation. Although both parents divided the responsibilities in many families, working women were harder hit by the lack of childcare outside the home than their partners.[56] Mothers were more likely than fathers to be impacted by reductions or changes to their working hours. In principle, this pattern can be explained by the additional childcare responsibilities and the loss of job opportunities.[57] In the USA, women working in the service sector were the hardest hit by job losses.[58] To date, a similar situation has been largely avoided in Germany thanks to the short-time work scheme, but there is nothing to rule out subsequent repercussions. In any case, the asymmetrical division of additional childcare responsibilities between mothers and fathers is obviously not solely due to gender-specific differences in changes to working hours.[59]

Surveys show that during the COVID-19 pandemic mothers have combined their jobs in home office with household responsibilities (usually childcare) more often than fathers,

54 Cf. European Commission (2016) and Wissenschaftlicher Beirat beim Bundesministerium der Finanzen (2018) and the evidence cited therein.

55 Cf. Bauernschuster & Schlotter (2015); Grewenig et al. (2020); Kleven et al. (2019).

56 Cf. Alon et al. (2020); Zinn et al. (2020).

57 Cf. Dullien & Kohlrausch (2021); Hans-Böckler-Stiftung (2020, Graph 3).

58 Cf. Alon et al. (2021).

59 Surveys have shown that if a man loses his job, the childcare and housework will be divided 50/50 between partners. However, if a woman loses her job, she will take on more of the household responsibilities (cf. Andrew et al. (2020)).

which has also led to them being disturbed and interrupted more often while working.[60] Assuming this leads to a drop in productivity, there may be negative repercussions on pay and job opportunities. Those who must care for others at home are generally at a greater risk of losing their job.[61] This situation could strengthen some employers' expectation that it is primarily the responsibility of women to care for children and family members. That in turn reduces women's chances of being hired, promoted and further qualifying themselves.

Effects to the contrary are also possible, however. Although mothers have borne the brunt of additional household responsibilities during the COVID-19 pandemic, surveys have also shown that fathers have been more involved in childcare during this time – especially when they experienced unemployment or short-time work. Empirical research suggests that if these effects are long-lasting, men's involvement in childcare could increase in the medium term.[62] Mothers could also benefit from the fact that most companies have become more accommodating in terms of flexible working hours and home office arrangements during the pandemic. If this flexibility remains beyond the pandemic, it may become easier in the future to combine work and family life.[63] It still remains to be seen, however, whether career opportunities will continue to depend on people being physically present at the office.

Potential courses of action

Attitudes towards gender equality are largely determined by social norms, although government institutions and their influence on social norms also play a role.[64] For example, family policy decisions like childcare provisions and parental leave pay regulations have an impact upon social norms and the careers of working mothers.[65] With a view to closing the gender care gap that has been exacerbated by the COVID-19 pandemic, additional months for partners could be added to the parental leave payment scheme.[66] Similarly, additional childcare spaces could be created to counteract the job loss or reduced hours that some parents are facing.

As it stands, the amount of government transfer payments depends on net income rather than gross income. As a result, the tax bracket applied to married couples translates

60 Cf. Andrew et al. (2020).

61 Cf. Adams-Prassl et al. (2020).

62 Cf. for example Alon et al. (2020); Tamm (2019).

63 Cf. Alon et al. (2020); Goldin (2014).

64 Cf. the literature overview and the discussion in Alon et al. (2020) and Kawaguchi & Miyazaki (2009).

65 Cf. Bauernschuster & Schlotter (2015); Fitzenberger et al. (2004); Rainer et al. (2013).

66 Cf. Frodermann et al. (2020); Schmieder & Wrohlich (2020); Tamm (2019).

directly to inequalities in the case of wage replacement transfers, e.g. for parental leave, short-time work, and unemployment benefits. This can put the secondary earner in a marriage (most often the woman) at a disadvantage. Internal family negotiations can also be impacted, and often there is little incentive for the secondary earner to work at all. On that basis, it would be worth considering calculating transfer payments irrespective of tax brackets. The tax bracket also determines the marginal tax rate for breadwinners and secondary earners throughout the year. If government and society are truly interested in contributing to equal labor force participation, it could be meaningful to reform the joint taxation system for married spouses.[67]

The gender-specific effects of the COVID-19 pandemic already mentioned and the extensive government action taken in response to the pandemic provide motivation to address the issue of gender neutrality in government measures. The only way to achieve this level of neutrality is to recognize and understand the economic impact of measures on women and men. The practice of gender budgeting provides useful identification and assessment criteria that should be given more consideration.[68]

3.5 Adjusting the level of protection provided through social welfare systems

The COVID-19 crisis has highlighted the groups of the population that currently have little protection through the social welfare system. This is true in particular for the self-employed and those working in marginal employment. As a result of the COVID-19 pandemic, the number of people working in low-paying, marginal employment ('minijobs'), has dropped from 7.5 million at the start of 2020 to 7.0 million at the start of 2021, a decrease of more than half a million.69 Since the introduction of the German social insurance legislation, people in marginal employment have been exempt from social insurance contributions or income tax. Originally, the idea was to save on administrative expenses. Instead, employers pay fixed contributions but then shift the burden to employees who end up with less attractive working conditions.[70]

These working conditions were already being critically discussed even before the start of the pandemic. Marginal employment is not fulfilling its intended purpose of acting as a stepping stone to the workforce. By establishing a low-income threshold, marginal employment – in combination with joint taxation of spouses – has led to pitfalls that stop career progression, halt the development of human capital and prevent the creation of jobs offering adequate pension schemes. From the employer's perspective,

67 Cf. Bach et al. (2020); Wissenschaftlicher Beirat beim Bundesministerium der Finanzen (2018).

68 Cf. Cengiz et al. (2019); Kuhl (2010); Wiesner (2021).

69 Figures can be found in the employment statistics provided by the German Federal Employment Agency.

70 Cf. Tazhitdinova (2020).

marginal employment is more flexible than employment subject to social insurance contributions, but it is also associated with higher employer contributions. Empirical evidence suggests that marginal employment is replacing employment subject to social insurance contributions to a certain extent.[71] The pandemic has most notably drawn attention to the limited social protection available to those in marginal employment. Since they are not covered by unemployment insurance, they have not been able to take advantage of the short-time work scheme during the pandemic, despite its further extension.

Throughout the COVID-19 crisis, self-employed members of the workforce have often been particularly hard hit and have repeatedly struggled to survive financially. They have neither received protection through unemployment insurance nor have they been included in the short-time work schemes that were so important during the crisis. It could be problematic if this experience makes people even less willing to start their own businesses and be self-employed in the wake of the pandemic than before (see chapter 2).

The situation during the COVID-19 pandemic has been quite different for pensioners, who have found themselves in an unusually better position than those still paying into their pension pots. Following sizeable pension increases of 3.45% in the West and 4.2% in the East beginning 1 July 2020, pensions should have been reduced in 2021 to account for the drop in income caused by the pandemic. Yet, since pensions are guaranteed, it is not possible to realize reductions. Instead, the so-called 'recovery factor' implies that future pension increases will be lowered until the original balance between pensions and the average wage has been restored.

This is relevant for pension adjustments in 2021 since the base, the average wage, has decreased. However, in 2019, the government suspended the 'recovery factor' until 2025, meaning that pensions will continue rising against earned income. In sum, the COVID-19 pandemic will put pensioners in a better position relative to those in the workforce over the next years.

Potential courses of action

One option for reforming marginal employment could be to incorporate it into the short-time work scheme, but this could result in a failure to consider other fundamental reforms. Therefore, a better option would be to consider completely doing away with marginal employment (i.e.'minijobs' with a monthly salary of 450 euros or less, along with 'midijobs' with a monthly salary ranging between 450.01 euros and 1,300 euros), or at least imposing significant restrictions. Restrictions could involve a return to lower

71 Corresponding analyses are provided in Brüggmann (2020); Caliendo et al. (2016); Collischon et al. (2020); Groll (2015); Tazhitdinova (2020).

maximum earnings (e.g. 100 euros per month instead of 450 euros per month). Alternatives would include imposing a maximum duration on the amount of time for which each person could go without paying insurance contributions or to limit this type of employment to certain groups of the population (e.g. students and pensioners). As a result, people would not be able to benefit from the option to avoid paying tax and contributions by falling under the marginal employment provisions for their part-time work.

Discussions with practitioners (e.g. tax advisors and employees of the inland revenue office) should be sought out in order to find a way to make the regulations for marginal employment simpler for private households, especially since these jobs are at particular risk for drifting into the shadow economy if they are no longer exempt from social insurance contributions. Similar to the existing procedure for registering employees in private households who are earning 450 euros or less per month ('Haushaltscheckverfahren'), further clear, simple procedures need to be defined. The Césu (Chéque Emploi Service Universel) system in France could be a useful model to follow.[72]

To reduce the problems caused by the lack of protection for the self-employed and keep self-employment attractive, options for voluntary unemployment insurance for the self-employed could be expanded and grants for new businesses could be increased.[73]

If the ultimate aim is to reduce the advantageous position of pensioners over people still paying pension contributions, a reasonable solution would appear to be reintroducing the 'recovery factor' to the pension adjustment calculation before 2025 (when this is due to happen anyway). This would permanently lower the pension level by a slight margin and reduce sharp increases in contribution rates.[74] Whilst this measure would reduce the permanent relatively advantageous position pensioners find themselves in following the COVID-19 pandemic, it would not address the question of an appropriate absolute pension level that is viable in the long term. This requires a separate analysis in combination with the adjustment of the legal retirement age.

72 Cf. Césu (2021).

73 See Jahn & Oberfichtner (2020) and Oberfichtner (2019) for a discussion of this topic. Cf. Schoukens & Weber (2020).

74 Cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2020), Chapter 6; Werding (2020); Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2021)b.

4 Capacity of government organisations

The COVID-19 pandemic has highlighted just how much the economy and society rely on the capacity of government organisations. Considering the role of governmental institutions during the COVID-19 crisis – and without taking anything away from the commitment and dedication of their staff – shortcomings have become apparent in Germany and the rest of Europe. The German economic model is based on private autonomy, open markets, and competition, which are protected and secured by a government regulatory framework. The government's capacity is also critical in many areas in which private and public interests diverge, especially in crisis situations. This requires much more than just the provision of adequate funding and human resources.

- A public good such as protection against infection can only be guaranteed by government regulations and measures, which are also required to curb the spread of the virus and to achieve herd immunity. It is essential to keep the public informed and use suitable means to convince them to do their part; ultimately, each individual's behaviour can have a far-reaching impact beyond just the people they personally come into contact with and potentially infect. Incentives relating to liability and financial compensation have little effect when it comes to protecting against a virus in a free society, despite their use as measures to influence behaviour in other areas.

- The experience of the COVID-19 pandemic has shown the importance of government provisions in several realms. This includes education, healthcare, and funding for basic research: the speed of vaccine development can be largely credited to public funding.

- Government measures to mitigate the negative effects on citizens and businesses are important for compensating the consequences of the pandemic restrictions, whether these were government-imposed or voluntary. An event such as a global pandemic is something for which private-sector insurance schemes were not able to prepare in advance. With that in mind, it is even more important to take measures to cushion the damaging effects in the aftermath. This level of compensation can only be provided by the government, as it lays the foundations for the subsequent economic recovery and provides an ex-post insurance against the collective damage caused by the COVID-19 pandemic.

The pandemic has clearly demonstrated advantages and disadvantages of Germany's position within the European Union and the global economy. Germany is heavily involved in international trade and relies on open borders for people and goods. In addition to the economic advantages of international networks, international diversification ensures a more secure supply of raw materials and primary products than if production were to be kept exclusively within national borders. Germany has a considerable interest in safeguarding global cooperation. Tendencies toward international isolation and de-globalisation that have come about during the pandemic and cast doubt on the advantages of the international division of labour should not be encouraged.

The downsides of Germany's highly international economic structure include not only the risk of the virus being brought in through open borders but also the risk of German companies being too dependent on trade partners beyond national borders. The pandemic has revealed that the international division of labour makes supply chains susceptible to disruption and is also affected by the strategic behaviour of other countries in response to crisis situations. These aspects call for coordination with international partners.

4.1 Analysis

Although analysis of the government's crisis management will have to remain ambiguous due to a lack of data and can therefore only be supported with anecdotal evidence, it is still clear that the COVID-19 crisis has shed light on areas in need of serious improvement when it comes to the capacity of governmental institutions on a national and international level. On this basis, the following subchapter begins by outlining the areas in which the capacity of government organisations could be improved. This preliminary analysis will be followed up by a summary of possible courses of action.

4.1.1 Crisis management

- The response to the pandemic was largely reactive, which was completely understandable given the novel nature of the threat. Having said that, the Federal Office of Civil Protection and Disaster Support had already set out a similar scenario for the spread of a Coronavirus back in 2012, which fully captured current developments. Recommendations were outlined that would have been cost-effective to implement in comparison with the actual costs incurred to date.[75] Moreover, compared internationally, some other Western democracies were quicker and more proactive in their response. For example, Austria rolled out systematic testing very early on and the UK tested with a view to gathering research data rather than limiting testing to people showing symptoms.[76]

75 Cf. Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (2013).

76 The UK introduced random sample testing as Pillar 4 of its testing strategy: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/878121/coronavirus-covid-19-testing-strategy.pdf (Accessed: 20/03/2021).

- The prevention paradox – when successful preventative measures appear to have been unnecessary after the event – gave the misleading impression in Germany and elsewhere that positive developments occurred independent of restrictions enforced by the government. It was overlooked and even blatantly ignored on a number of occasions that easing measures to stop the spread of the virus upon reaching target values leads to a resurgence of infections.

- In some cases, lockdown measures were eased on the basis that the pandemic could be kept under control using alternative strategies, but those strategies, such as test and trace, were not rolled out consistently.

4.1.2 Distribution of duties and responsibilities within the federal system

- The crisis coordination committee made up of the Chancellor and the federal states' governors was convened on an ad hoc basis to manage this unprecedented crisis. As the pandemic has continued and communications from the government have come from many different parties and even been contradictory at times, the coordination between the federal government and federal state and local authorities has faced more backlash as time has gone on. It is hard to say whether it would have been better to have a more central approach to managing the pandemic led by the federal government or to have had more input from the local parliaments. One question being asked in particular is whether more thought could be given to the wider regional impact of measures taken by states and local authorities on their neighbours.

- It is also unclear whether an alternative government organisation could help address the allocation of responsibilities, which has not appeared very transparent to the general public until now. A more unified approach could also potentially create greater clarity surrounding the regulations in place at a particular point in time. This would have to be weighed up against the benefits of an approach adapted to regional circumstances, however. It would also be important to consider the extent to which a free and pluralistic society would be willing to forgo diverse crisis management communication.

4.1.3 Operational adaptability

- From the very start of the pandemic, data protection was a major consideration. This limited some of the actions the government could take, with particular reference to the COVID-19 mobile app. The government did not attempt to enter into a wider discussion about the importance of data protection in light of concerns surrounding public health and the additional damages on health, society and the economy that stemmed from the implemented measures. In hindsight, a thorough analysis of competing fundamental rights could have led to a different outcome.

- Shortcomings in digitalisation led to inefficient operational procedures rolled out by the health authorities and meant that key initiatives could not properly get off the ground, including the prompt analysis of infection rates by region and real-time monitoring of new virus variants.

- There were also serious issues involved with the switch from in-person to distance learning at schools (see text box). This was due in part to the abrupt nature of the change as well as earlier failures to integrate new technology into education policy. Furthermore, despite the experts' warnings of the danger of a second wave, too few precautions were taken in Summer 2020 to prepare to quickly adapt teaching methods and materials in the event of further school closures.

Government capacity during the COVID-19 pandemic: Case study: school education

The COVID-19 pandemic has revealed the extent to which society relies on the public school system working effectively. The government is responsible for the structured supervision of children and adolescents on a daily basis, arrangements for the transfer of knowledge and skills, and the central social role of schools for pupils. There is absolutely no denying that headteachers, teachers and everyone else working in schools and school administration settings have worked extremely hard throughout the pandemic. Yet, there are structural shortcomings that we would like to address here.

Examples of shortcomings during the pandemic

1. The schools were often left with just one or two days to prepare to reopen, with the necessary measures being announced right at the last minute. This approach only added to the extreme uncertainty that already existed amongst pupils, students, parents, teachers and schools.
2. During the school closures, schools lost contact with some children and adolescents. During the first lockdown, there were also very few online lessons together with the entire class. As part of a representative population survey, data collected from more than 1000 parents of school-age children revealed that 57% of pupils had an online lesson delivered to their class less than once a week during the first lockdown. Only 6% had an online lesson delivered to their class every day.[77] One-to-one contact with teachers was even more seldom. When the schools were closed for the second time at the start of 2021, a quarter of pupils and students had online lessons delivered to their class every day, whilst 39% had online lessons no more than once a week.[78]
3. In most cases, the digital platforms available to schools were not designed to cope with the large number of participants. Particularly with regard to video conferencing apps, it was difficult to find a solution that ticked all the legal boxes and complied with the relevant data protection regulations.
4. Even after the first wave of COVID-19, many schools were still not equipped with long-term solutions for delivering online lessons via video conferencing, meaning that they were not well prepared for further closures when the second wave hit. There was no plan for a large-scale switch to online teaching, in which teachers would follow a timetable and deliver content to all pupils in online lessons via video conferencing.
5. The different approaches followed by different states caused even more confusion and uncertainty amongst the population. Coordination between the states under the umbrella of the Standing Conference of the Ministers of Education and Cultural Affairs was usually limited to setting general objectives. Decisions about schools made at meetings between the state governors and the Chancellor were often obsolete within a matter of hours, by which point individual states had swiftly announced their own contradictory regulations.
6. The fact that the states have ultimate authority and financial responsibility when it comes to teaching staff but material expenses usually fall under the remit of local school boards has caused serious problems in coordinating the response to the COVID-19 pandemic. For example, this situation has made it difficult to apply a universal approach to making decisions on protective measures or setting up a digital infrastructure given that the responsibility for this fell to the school boards.

77 Cf. Wößmann et al. (2020).

78 Cf. Wößmann et al. (2021).

7. The federal government funds pledged under the 'Digital Pact' in 2019 and provided as part of the COVID-19 recovery measures were not accessible to schools for some time owing to the complicated hierarchy of federal responsibility. As an example, not even half a percent of the money allocated under the 'Digital Pact' had been accessed by summer 2020.[79]

8. The school closures also meant that less content could be covered in lessons and exams could not go ahead as normal. Curricula were not adapted to the circumstances as planned and most changes were not communicated transparently.

9. Most states made the conscious decision to stop all learning assessments for an extended period during the pandemic. This makes it difficult to come up with an evidence-based response to the pandemic in schools and impedes a critical public discourse based on the results of the government's education policy.[80]

Possible causes

1. Federal structure: The distribution of responsibilities within the federal structure of the education system would appear to be behind some of the shortcomings discussed. With decision-making power at the state level and responsibility for material expenses at the local authority level, it has been difficult to act quickly in a coordinated effort to develop and roll out protective measures in schools and purchase and implement the technology required for online distance learning. It is also possible that additional strains on local authority finances in recent years, which were not countered by any extra financial capacity, may have worsened the hesitant approach to solving problems.

The complexity of the hierarchy of federal responsibility and the legal regulations needing to be agreed upon between the federal government, states and local authority school boards have so far prevented schools from accessing the federal funding pledged under the 'Digital Pact' and COVID-19 recovery measures.

2. In Germany, the potential for competition between state systems at the education policy level has not been able to fully develop owing to a lack of available data and limited standards for making comparisons between states.[81] This applies to discussions in the public and the media as well as research focused on state comparisons.

3. Lack of clear political guidelines and regulations: A lack of clear political guidance by the relevant ministries on key issues also made it difficult to quickly roll out viable protective measures in classrooms and effective distance learning concepts across the board. The responsibility for decisions on the necessary protective measures often fell to individual schools, and there was also a distinct lack of clear guidance and communication. This concerned, for example, regulations on mandatory contact between teachers and students and explicit orders for compulsory daily online lessons delivered via video conferencing during school closures.

4. Weaknesses of operational implementation: The COVID-19 crisis has also uncovered administrative weaknesses, ranging from shortcomings at the management level of the administration and ambiguous official letters being sent to schools to the inadequate implementation of protective and supportive measures in schools.

79 Cf. Rachel (2020).

80 Cf. Nationale Akademie der Wissenschaften Leopoldina (2020)b.

81 Cf. Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2016).

4.1.4 Open borders: people and medical supplies

The role of national borders has been under a great deal of scrutiny during the pandemic, as several specific examples demonstrate.

- Border controls have been greatly reduced over the past few decades, which has encouraged international mobility. Yet, this open approach has conflicted with the need to curb the spread of the virus during the pandemic.

- During the COVID-19 crisis, borders have been closed and export bans on certain medical supplies have been enforced as an emergency response by Germany and other member states, with serious repercussions for the economy and society.

- Exports to certain countries outside of the EU require authorisation, with approval being sought from the relevant member state. Taking the position of the European Commission into consideration, each country then decides on whether to grant authorisation. Careful coordination is required here, with the system at risk of breaking down if some countries are more liberal than others and the European Commission is not able to make its voice heard.

- Borders have also been a central issue in conjunction with the travel regulations. It is problematic, for example, when one member state allows bars and ski resorts to open in order to attract tourists from other member states, creating a risk of them becoming infected on holiday and spreading the virus once they return home.

4.1.5 Strengthening resilience: production and provision of vaccines

The coordination of activities that go beyond a nation's own capacities and interests is particularly meaningful from a public health and innovation point of view.

- When it comes to supplying medical products and vaccines, for example, cost-effectiveness has to be weighed up against supply security. Given the importance of medical supplies, supply security is an extremely relevant consideration. It is worth considering diversifying production and acquisition of these goods, even if it means higher purchasing costs in certain situations. The EU, owing to its single-market ties, seems to provide an appropriate framework for such a diversification strategy. There is a chance that the regulation of the united single market and the resulting coordination necessary between the EU member states will involve less tension within the EU than between countries that are not part of the EU or otherwise closely linked to it.

- The vaccine procurement process can be taken as a valuable lesson here. By placing orders together through the European Commission, the EU member states had the advantage of approaching manufacturers with a greater market power. Had each country placed an individual order, there would have been an overwhelming volume of contracts. Preventing this also helped to avoid uncertainty regarding whether delivery commitments were actually realistic. There were potential drawbacks of this approach at the national level, however. Compared to other countries like the USA and the UK, only modest amounts of vaccine doses could be acquired early on.

- To successfully fight the pandemic, it is also necessary to look beyond the borders of Germany and Europe. The position of Germany and the EU in the global economy means that Germany will likely face negative repercussions if the rest of the world, particularly developing countries, is not vaccinated quickly and comprehensively.[82] With that in mind, it is meaningful for Germany to also consider people outside of the EU and other developed countries rather than just quickly taking care of its own population during a pandemic. Helping such countries with their vaccine rollout is not only an act of solidarity; it is also in the Germany's own interest.

4.2 Potential courses of action

There is not enough information available to date to formulate any concrete courses of action in response to the issues outlined. A non-political Investigative Committee commissioned by the federal government and states to review the handling of the pandemic and put forward reform recommendations could be relied upon to review the presumed shortcomings put forward and any potential need for reform. It seems appropriate to grant this Investigative Committee the opportunity to conduct evaluations based on current available data, to call in experts and to incorporate the expertise of administrative institutions into their considerations. When setting up the committee, conflicts of interest on the part of members caused by their activities, particularly during the pandemic itself, should be taken into account and avoided. This would apply to people in administrative and political roles as well as those providing policy advice. It may also be meaningful to keep scientific and ideological balance in mind when making appointments to the committee.

Potential topics to be covered by the committee are outlined below. It may be advantageous to officially task the committee with making recommendations that could directly support politicians in making policy decisions. The topics outlined below cover aspects relating to crisis management, the distribution of duties and responsibilities within the federal system and needs for operational reform. School education and public health

82 Cf. Cakmakli et al. (2021).

require closer attention. On the one hand, significant shortcomings have been exposed in these areas, and on the other hand, these areas will be central in the event of similarly challenging crises in the future. The apparent need for international regulations in terms of border traffic and the coordination of healthcare measures also deserve consideration here.

4.2.1 Crisis management and resilience

In the medium term, it can be expected that there will be further threats in the form of infectious diseases and other crisis situations that lead to similar situations. With that in mind, it would be meaningful for the federal government, states and local authorities to strengthen resilience to all kinds of crises within the community. This could be achieved in coordination with the EU. From the current perspective, the following topics could be of interest for the Investigative Committee:

- To what extent is it necessary to improve the monitoring of newly developing infectious diseases and continually ensure that potentially needed back-up material and human resources within the healthcare sector are available?[83] How should contingency costs be balanced against the anticipated benefit of back-up resources?

- How can the population be better prepared for crisis situations and become more resilient in their efforts to overcome them? Can our risk literacy (our practical ability to evaluate and understand risk) be improved? To what extent could risk communication and reporting on crisis situations contribute to better risk management?

- Is the government's planned new direction for the Federal Office of Civil Protection and Disaster Assistance (BBK) enough to ensure better preparation for crisis situations that may develop in the future and to ensure that responsibility for crisis management is better shared between government departments?

- Alongside pandemics, flooding and droughts are climate-based natural phenomena for which precautions can be taken. Should obligatory insurance be introduced ex-ante to cover the effects of future crisis situations? Business interruption insurance would be one option as far as pandemics are concerned, potentially backed up by catastrophe bonds (CAT) or the like. Ex-ante insurance to cover future events could result in better protection in the aftermath of a disaster as well as additional preventative measures to minimise potential damages, which would in turn increase resilience in society.

83 Cf. Abbey et al. (2020).

- How should the right to data protection and informational self-determination be ranked against other fundamental rights like the freedom of assembly? As the experience of the pandemic is being processed, it is important to reflect on the government's actions and handling of conflicting legal interests with a view to being able to work most effectively in the public's interest in the future.[84]

- How can data be used to improve the response to crisis situations? To make evidence-based political decisions in a crisis situation, it is essential that current, reliable information is available. During the COVID-19 pandemic, relevant indicators for economic and healthcare policy were lacking. Compared to other countries, Germany seems not to rely enough on findings from government statistics and survey research. For example, the US government used real-time population surveys conducted by the Federal Reserve[85], whilst data collection often lags months and sometimes even years behind in Germany.[86]

- Another avenue to explore is whether and how better foundations for effective crisis management could be laid by (i) providing more money and staff for data collection, especially at statistical offices, and (ii) improving data skills within administrative institutions.[87]

84 Cf. Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2021) and the discussion in Section III.2.

85 Cf. Bick & Blandin (2020); Federal Reserve Bank of Dallas (2021); Real-Time Population Survey (2021).

86 Alstadsæter et al. (2020) had already published a working paper in May 2020 that contained Norwegian data from March and April 2020.

87 Cf. Bundesregierung (2021).

4.2.2 Distribution of duties and responsibilities within the federal system and the EU

The Investigative Committee could also be tasked with analysing the allocation of roles within the EU, federal government, states, and local authorities and their interaction with non-governmental institutions. The distribution of duties and responsibilities within the federal system and the process of making political decisions (decentralised majority decisions or central responsibility) would also need to be considered with respect to legitimacy and adaptation to heterogenous needs (principle of subsidiarity).[88]

The aims of potential reforms should consist of enabling an effective response to crisis situations, encouraging proactive preparation for dealing with unforeseen events, and facilitating quick action and adaptability. It would be important to carefully balance out the tensions that arise when considering local idiosyncrasies and the requirements of a coordinated public health effort that avoids negative external effects across borders resulting from different local strategies. Another point of consideration is how to take local differences into account without decentralisation negatively impacting upon the crisis response.

In the long term, it would be crucial to investigate whether a specific institutional framework could be introduced to improve the coordination required between member states and the EU when responding to pandemics and natural and environmental disasters (e.g. radioactive contamination). The framework would serve, for example, to stop the international spread of infections across open borders and limit the negative effects of national government measures on other countries by effectively coordinating responses. This would make it possible to guarantee that border closings for people within the European single market could be used as an emergency strategy.

4.2.3 Reforms for better operational adaptability

The Investigative Committee could also be tasked with identifying ways to optimise the capacity of governmental institutions without compromising on legal security for citizens – the main advantage of bureaucracy being its rule-abiding nature. Reviewing bureaucratic processes could help to improve the effectiveness of the system and the quality of service. Two issues could be the main focus here.

First, organisational improvements to administrative institutions could be taken into consideration, including shifting the focus toward results, improving the efficiency of activities, simplifying procedures, defining clear responsibilities and professionalising the management level. Continuing education and training for administrative

88 Cf. Nationaler Normenkontrollrat (2020), Chapter 1.2.2.

staff could play a role, alongside matters of governance and management. Suggestions for systematically improving the capacity of the government and administrative institutions to take action have been put forward since the refugee crisis but have not been implemented to date.[89]

Second, the experience of the pandemic has also highlighted the urgency with which digitalisation needs to be rolled out to the administrative institutions. This requires the relevant funding and training to be provided.[90] With that in mind, it seems advisable to coordinate digitalisation beyond the municipal level. Requirements surrounding data security would also need to be taken into account. This would be difficult to achieve if software manufacturers could be obligated by the authorities in their home countries to grant access to data.

The introduction of councils to advise individual states on how to set up their own structures, following the example of the national Normenkontrollrat, could be another approach to consider.

4.2.4 School education

One of the main tasks of the non-political Investigative Committee suggested here should be to look into the handling of the COVID-19 pandemic in schools and put forward reform recommendations (see the text box). Unlike in other countries, there was no universal response to the pandemic at the school policy level. Face-to-face teaching was not scaled back as strongly in other countries as in Germany.[91] The next logical step would be to retrospectively evaluate the advantages and disadvantages of Germany's approach compared to other countries.

One key question would be whether the responsibilities and skills within the federal structure need to be shifted around in order to allow for an effective response to crisis situations, encourage proactive preparation for dealing with unforeseen events, and facilitate quick action and adaptability when necessary. It would also be important to consider how reliable collaboration between German federal states can be established as the norm. A nationwide framework of regulations and standards could be a useful tool for addressing key areas, such as the provision of digital communication platforms that are legally sound and comply with data protection provisions. In this way, a government contract could potentially be used to enforce, standardise and simplify administrative processes and central frameworks.

89 Cf. Nationaler Normenkontrollrat (2017), especially Section III.3.

90 Cf. Nationaler Normenkontrollrat (2020).

91 Cf. OECD (2021).

The Investigative Committee could also be asked to look into the scope of the coordination between representatives of the education and social sectors (e.g. welfare institutions and child and youth welfare services) during the pandemic. In some regions, staff working in these areas were furloughed (e.g. school assistants for children and adolescents with disabilities), whilst their workload was increased in other regions during the pandemic.

Crisis situations are easier to overcome when the government provides clear guidance and takes responsibility for important decisions. Operational shortcomings could be mitigated by measures associated with greater accountability in terms of implementation and results achieved. In particular, these measures would include reliable learning assessments, which were suspended in most states in Germany at the start of the pandemic. The development and provision of universal, reliable concepts for effective distance learning and viable relationships between students and teachers could result in the school system being better prepared for any further school closures in the future.

The pandemic fast-tracked the use of online and hybrid teaching. As a result, the consequences of inadequate technical equipment combined with a lack of experience using these methods have become apparent. It seems worth considering investments in applied concepts to ensure the proper use of digital technology and training for teaching staff on how to professionally integrate digital media into the classroom. A scientific evaluation of methods used elsewhere in the world could provide a better understanding of this topic.[92]

4.2.5 Public health authorities

Suggesting ways to improve the capacity of the public health service would also fall under the remit of the Investigative Committee. When looking to improve the services provided by public health authorities, their finances and staffing should first be reassessed. Other steps to be considered include rolling out state-of-the-art IT solutions nationwide, making it attractive for people to work for the public health service, providing further education and training, and strengthening connections to the research community.[93]

When it comes to coordination within the federal system and the education sector, the current distribution of responsibilities and skills should be reviewed to ensure that responses to crisis situations can be effective and flexible. Looking into ways of

92 For specific recommendations on this, cf. Nationale Akademie der Wissenschaften Leopoldina (2020)b.

93 Cf. Nationale Akademie der Wissenschaften Leopoldina et al. (2015).

combining analogue and digital workflows and processes could boost efficiency. That includes making swift progress with digitalisation on the basis of standardised and compatible systems.[94]

With a view to being prepared to tackle future crisis situations, the committee should systematically review public health services, considering the international level as well as cooperation at the European level. Analyses should identify ways of improving coordination and cooperation between public health stakeholders and incorporating institutions and administration on various federal levels all the way to the service providers in hospitals and practices. There are several indications in favour of connecting the various levels of public health services, both regionally and in regard to the research community.[95]

If an analysis were to reveal that not all groups of the population had equal access to public health protection during the COVID-19 pandemic, the committee could also look into ways of setting out a prevention strategy and clearly communicating with specific target groups going forward.

4.2.6 International cooperation on healthcare measures

Responding to a pandemic has required a great deal of coordination between the EU member states. With a view to being equipped to handle similar situations in the future, the Investigative Committee could discuss the formation of a supranational institution for researching, monitoring and coordinating relevant health policy measures across the EU (European Health Board). Although issues relating to health policy are fundamentally different, one basic principle can be taken from the European response to the financial crisis: institutions and regulations were created to deal with the cross-border effects of discrepancies within the finance system with a particular focus on the relationship between the EU and its member states.

For example, the European Systemic Risk Board (ESRB) was set up in the wake of the global financial crisis with the aim of balancing national and supranational interests within the finance sector more effectively. Responsibility for measures taken to secure financial stability may remain at the national level, but there is close coordination and monitoring at the European level to make it easier to counteract negative effects across borders.

94 Cf. Streibich & Lenarz (2021).

95 Cf. Nationale Akademie der Wissenschaften Leopoldina (2020)a.

Were a similar institution to be established within the healthcare sector, its responsibilities could include compiling lessons to be learnt from the process of procuring vaccines and drawing up guidelines for similar situations in the future, particularly for dealing with export bans. There is also the question of how to approach preferences for exclusively unilateral measures, for example the national use of Russian and Chinese vaccines by Eastern European EU member states, which also caused delays in the procurement of alternatives across the EU.

The Investigative Committee could also be tasked with considering global coordination that goes beyond the EU. Ideally, the coordination of subsidies for the production of vaccines, the continuity of the vaccine trade, the avoidance of protectionist tendencies and the creation of transparency regarding production capacities, production, storage and international trade flows would guarantee the global supply of vaccines. These activities would go well beyond the remit of the COVAX initiative, whose support has ensured that poorer countries are not priced out of access to the vaccine. The framework for the ongoing coordination of measures could lie at G20 level, for example. It has to be said, however, that an initiative of this scale would require a very high level of trust between all parties involved, which may be unrealistic to achieve.

5 Sustainability of public finances

Government measures taken in response to the COVID-19 pandemic have helped to largely stabilise the economy during this time. One example is the extensive government aid provided to keep companies affected by the pandemic and lockdowns afloat.96 The government aid and support measures are tied to public budget deficits and an increase in public debt, even though these are actually not very high by international comparison.

In 2020, Germany's deficit was 4.2% of the gross domestic product (GDP), with the majority being accounted for by the federal government (2.6%) and social welfare funds (1%), and a small proportion by the states.[97] The aid and recovery packages caused Germany's public debt to rise from around 60% to just under 70% of the GDP by the end of 2020. The German Stability Programme published in April 2021 predicted a deficit of 9% of the GDP for 2021. Loan guarantees for affected companies pose further risks for government finances and the new Next Generation EU fund (NGEU) will create additional expenses over the coming years that will need to be financed.[98]

The increase in the debt ratio is more or less on a par with the financial crisis of 2008/09. Given the historically low interest rates, it is highly likely that public finances are sustainable (see Table 1). Having said that, the interest rate could rise in the future and the measures set out in chapter 2 and 4 to improve structural changes and the government's capacity will require more expenditures at least on a temporary basis. Companies and banks find themselves in a precarious financial situation, which could make the recovery and return to the pre-pandemic path of economic growth difficult. There is also the danger of hasty consolidation in the face of so much uncertainty surrounding the global economy delaying a shift back towards full-time employment and ultimately entailing higher fiscal costs. These risks need to be considered.

Germany's social insurance systems are also facing long-term challenges, as the baby boomer generation starts to retire whilst the birth rate is low and the average life expectancy is on the rise. The statutory pension funding issues arising from this, which already require significant subsidies from the national budget, will be exacerbated in the long term by the COVID-19 pandemic.[99] Social insurance reforms in other areas will

96 Cf. Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2020).

97 Cf. Bundesministerium der Finanzen (2021)a.

98 Cf. Deutsche Bundesbank (2021).

99 Cf. Börsch-Supan & Rausch (2021); Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2021)b.

also be necessary to counter the fiscal consequences of the demographic shift. Estimates show that spending on long-term care insurance will see a sharp increase in particular, whilst statutory health insurance will be affected slightly less dramatically.[100]

5.1 Development of the government debt ratio

There are several approaches to debt sustainability analysis.[101] The following chapter focuses on the government's debt ratio relative to economic strength as measured by GDP (i.e. government debt-to-GDP ratio). The reference values specified in the Maastricht Treaty indicate that debt should remain under 60% of the GDP.[102]

It is worth looking back at the financial crisis of 2008/09 to put the impact of the current pandemic on public finances into perspective. During the financial crisis, the German debt ratio increased from 64% in 2007 to over 82% in 2010, before coming back down to just under 60% by 2019.[103] Considering these figures, the increase in the German debt ratio in 2020 from 60% to around 70% is on roughly the same scale. Steady economic growth, increasing tax revenue and falling interest rates all contributed considerably to a decline in the debt ratio after the 2008/09 financial crisis.

Table 1 sets out hypothetical scenarios for how the public debt ratio could evolve in Germany up to 2050 based on different assumptions regarding the interest rate, economic growth and government surplus without factoring in interest payments (i.e. the primary surplus).[104] Increased growth, lower interest rates and a higher primary surplus equate to a lower debt ratio. The table does not indicate the likelihood of the scenarios. Rather, it only depicts the mechanisms behind the development of the public debt ratio in line with key economic variables.

100 Cf. Breyer & Lorenz (2020); Lorenz et al. (2020). There are conflicting views in academic literature as to whether increases in life expectancy will only shift healthcare costs to a later point in time or will actually cause them to rise.

101 Cf. D'Erasmo et al. (2016); European Commission (2020).whether fiscal solvency conditions hold

102 Cf. Holtfrerich et al. (2015).

103 Cf. Bundesministerium der Finanzen (2021)b.

104 Please refer to the appendix for further information on how the table was created.

Table 1: Projections for the German debt ratio given various scenarios, 2020–2050

Real growth rate		0%					1%					2%				
Real interest rate		-2%	-1%	0%	1%	2%	-2%	-1%	0%	1%	2%	-2%	-1%	0%	1%	2%
	-3%	107%	132%	163%	204%	257%	88%	107%	132%	163%	204%	73%	88%	108%	132%	163%
	-2%	85%	106%	133%	169%	215%	69%	85%	106%	133%	169%	56%	69%	85%	106%	133%
	-1%	62%	80%	103%	134%	174%	49%	63%	80%	103%	134%	39%	49%	63%	80%	103%
Primary surplus	0%	40%	54%	73%	99%	133%	30%	40%	54%	73%	98%	22%	30%	40%	55%	73%
	1%	18%	28%	43%	64%	91%	10%	18%	29%	43%	63%	5%	10%	18%	29%	43%
	2%	-5%	3%	13%	29%	50%	-9%	-4%	3%	13%	28%	-12%	-9%	-4%	3%	13%
	3%	-27%	-23%	-17%	-7%	9%	-29%	-27%	-23%	-17%	-7%	-29%	-29%	-27%	-23%	-17%

Key: Table representing the public debt ratio in Germany in 2050 on the basis of various assumptions as to the real growth of the GDP, the real interest rate on government bonds and the entire country's budget balance without factoring in interest payments (primary surplus).

Scenarios in which the debt ratio in 30 years would be lower than it is today are marked in green, whereas scenarios marked in red indicate a rise. Although there are clearly more green figures in this illustrative table, there are still scenarios in which the debt ratio would continue to increase, particularly those in which a shift back to higher interest rates occurs without the primary surplus being adjusted.

The table demonstrates that stabilisation is possible without any major consolidation measures provided that the interest rates stay low. As the expenses associated with the pandemic cease and the "debt brake" regulations for limiting net borrowing are reinstated in the medium term, a primary surplus of around zero should be possible. Given the current real interest rate of -2% and a growth rate of 1%, public debt would drop to around 30% of the GDP within 30 years based on pure mathematical calculations.[105] By way of comparison, a real interest rate of 2% combined with the same growth rate of 1% would require consolidation measures to be taken. With an inflation rate of 2%, this would equate to the nominal interest rates rising from the current level of zero to around 4%.

If the current low interest rates remain stable over a longer period, it will be possible to stabilise and reduce the debt ratio even if growth rates are comparatively low. Analyses of debt sustainability, however, are very sensitive to changes in the central variables

105 The real interest rate used below can currently be calculated as the yield on 10-year federal bonds minus the inflation rate. The yield on government bonds is slightly negative.

of growth and real interest rate. A downturn in growth in the long term along with increased expenditures for social welfare systems, for example due to the ageing population in Germany, could change the outlook. Major fiscal interventions could be required in that case, even if a targeted immigration strategy could slow down population ageing in the short and medium term. There is also the risk of the interest rate going up again in the future. Potential changes to interest rates can, however, be managed to a certain extent by extremely long or 'perpetual' maturities, as suggested by Cochrane for example.[106]

Equally, recent macroeconomic research shows[107] that, considering the strained balance sheet situation in the private sector, expansive fiscal policy could be crucial in getting production back to pre-pandemic levels and getting economic growth back on track. If fiscal policy follows the modelled version and has the corresponding impact on growth, the public debt ratio can decrease in relation to the GDP despite higher deficits or at the very least will not necessarily increase. In that vein, a responsible approach to stabilisation and structuring options afforded by the current low interest rates will be crucial as far as economic policy is concerned in coming years – as will staying smart when weighing up risks and opportunities.

5.2 Reintroduction of the "debt brake" and reform options

5.2.1 Analysis

Emergency clauses have been invoked to suspend Germany's principal fiscal rule, the "debt brake" and European fiscal regulations for the time being. This exemption allows for fiscal stabilisation measures to be taken. Support can be offered to households and companies who are currently seeing their activities restricted and their income affected by the pandemic and government regulations.

Two questions can be raised here: Firstly, when will it be possible to cease the use of emergency clauses and reinstate the "debt brake", returning to normal circumstances? Secondly, should the "debt brake" even be maintained in its current form?[108] The main consideration is whether the "debt brake" would make it harder to implement economic policy objectives, such as increasing public investments at a time when

106 Cf. Cochrane (2021).

107 Cf. Bayer et al. (2020); Hagedorn et al. (2019); Jordà et al. (2016).

108 A political debate was sparked by the comments made by Helge Braun, Head of the Federal Chancellery, in an article for the German newspaper 'Handelsblatt' on 26 January 2021. Blesse et al. (2021) demonstrate how the COVID-19 pandemic has changed the preferences of members of German state parliaments on the reform of the "debt brake". A reform of the "debt brake" is discussed, for example, in Hüther & Südekum (2020) and in several articles by different authors in Issue 5 of 'Wirtschaftsdienst' (cf. Bofinger et al. (2019)). Other contributions to the debate on the "debt brake" can be found in the journal 'ifo Schnelldienst' (cf. Schuknecht et al. (2021)). There, Schuknecht (2021) and Schnellenbach (2021) argue in favour of the "debt brake" being maintained in its current form.

interest rates are at historic lows. There is a serious and urgent need for investments to adapt the economy in line with the challenges of climate change and in turn enable sustainable growth.

In response to the first question: the constitutional “debt brake” allows the federal government a low ‘structural’ deficit of 0.35% of the GDP and demands a balanced budget for the federal states with economic influences being factored in, respectively. In 2020 and 2021, however, the German Parliament ruled that an emergency clause could be applied to the “debt brake”, meaning that the federal government is not bound by this target value. Analogous clauses were applied to European fiscal regulations (the Stability and Growth Pact (SGP) and the Fiscal Compact). Many of the federal states in Germany passed similar resolutions on the basis that this was and is the only constitutional way to finance government support measures during the COVID-19 crisis. The negative repercussions of hasty consolidation could potentially be much greater than the comparatively low costs associated with public debt at the moment.

Given the current legal framework, the question is raised as to when the “debt brake” exemption should be lifted, as the public budget can be expected to be consolidated in the medium term in line with German fiscal regulations. It is important to bear in mind that removing the emergency clause and reapplying the “debt brake” too soon after the easing of lockdown could undermine measures taken to support the economy and hinder the incipient upswing.

The second question needs to be considered separately – should the “debt brake” anchored in the German Constitution be maintained in its current form? There are various suggestions[109] for ways to modify the “debt brake” in order to systematically consider its use for achieving other political objectives. In light of this, it is meaningful to first explain the reasons behind introducing fiscal regulations like the “debt brake“. One reason cited in academic literature is an increased deficit trend within politics caused in part by different stakeholders accessing one common fiscal source as well as a certain short-sightedness within the world of politics.[110] When political decisions are based largely on short-term considerations, the benefits of government projects in the future are not given as much consideration, especially since younger generations may not yet be old enough to vote or are less inclined to vote.

However, on closer inspection, the problems associated with political short-sightedness are twofold. Firstly, there can be too much focus on current government spending, which is financed by public borrowing that will need to be covered by future taxpayers.

109 Cf. Bofinger et al. (2019).

110 Cf. Alesina & Passalacqua (2016).

Secondly, when public debt is on the table, government consumption expenditures in the form of staffing and social costs tends to be favoured over government investments, which primarily bring benefits in the future.

A fiscal regulation like the “debt brake” limits the first problem but does not address the second one. Doing away with the “debt brake” without replacing it in any form would, at least in principle, reduce the second problem because government investments could be financed by borrowing. Yet, this would not resolve the first problem. It is difficult to assess how to weigh up the relevance of these two problems against each other. Only one thing is clear: Both problems associated with short-sightedness are serious. On that basis, doing away with the “debt brake” without replacing it in any form is not recommendable. The same can be said for any other regulation that only addresses one of the problems associated with political short-sightedness.

5.2.2 Potential courses of action

More attractive incentives for forward-thinking investments could come in the form of a modified “debt brake” that allows for government net investments (gross investments minus depreciation) to be financed by borrowing. The option of financing investments with borrowing is called the ‘Golden Rule’, which already existed in Germany before the “debt brake” was introduced.[111] However, there were serious shortcomings associated with this approach before, partly due to the fact that the notion of investment within the context of the Budgetary Principles Act and the Federal Budget Code is not fully convincing in economic terms.[112] For example, spending on teaching staff is ultimately an investment in education, and yet it is not counted as an investment within the overall national accounts, even though their work in the education sector delivers benefits beyond the spending period.

It was also possible to finance gross investments with borrowing; with the scope of public capital stock only increasing by net investments, the net value is the appropriate economic indicator. Furthermore, the rule was only applied to budget plans and was not fully enforced, and the exemption clause, which was not linked to any concrete scenarios, was invoked very frequently.[113] On that basis, a return to the approach followed prior to 2009 is not recommended.

111 Other countries’ experiences with the Golden Rule are outlined in European Fiscal Board (2020). In Deutsche Bundesbank (2019), suggested reforms for fiscal regulations within the EU are put forward and the option of financing investments with borrowing is considered here amongst others.

112 A critical discussion on the notion of investment in Article 115 of the Basic Constitution before the introduction of the “debt brake” can be found in Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2007), Numbers 93 and 94.

113 Cf. European Fiscal Board (2020)b.

To effectively use the Golden Rule, there are several matters that need to be resolved regarding what actually qualifies as an investment. A definition of what spending can be considered as an investment in the economy needs to be established and net investments need to be identified by determining depreciation and spending that has been falsely categorised as an investment. In order to avoid these issues surrounding what qualifies as an investment, the Golden Rule would need to be established in conjunction with effective governance structures. This could include, for example, the certification of public investments by an independent expert committee[114] or the establishment of organisations to support investments, which could be tasked with maintaining consistent funding allocations from public budgets.[115]

Special allowances for environmental spending are problematic when calculating the permitted level of borrowing. Provided that environmental spending is considered to be an investment, it would already be covered by the Golden Rule. Moreover, greater allowances for this category of spending would only add to the problems outlined above surrounding the question of what qualifies as an investment.

Without appropriate governance structures being rolled out with the Golden Rule, there is the risk of neither of the two problems of political short-sightedness being addressed, meaning that the weaknesses of the fiscal regulations in place prior to 2009 would remain. Regulations should not be modified too often, since frequent changes can lead to a loss of credibility.

Still, it is important to keep in mind that any modifications to the “debt brake” would not be enough on their own to increase and improve public investments. A whole host of legal and planning problems must also be resolved. Examples include staff shortages in the planning departments at local authorities, complex tender processes, lengthy legal proceedings for infrastructure projects and problematic governance structures.[116]

The debates surrounding the reform of the “debt brake” and the “black zero” (i.e., zero deficit) policy should be kept separate on a conceptual level. The aim of Germany’s “black zero” policy is to keep the budget (at least) balanced. Easy to communicate in understandable terms within the public and political debate, this target was pursued by the government in the years that followed the financial crisis. It ultimately kept government spending under control albeit during a period of positive GDP growth rates and favourable conditions on the whole. Unlike the “debt brake”, the “black zero” policy

114 Independent expert committees are already relied upon elsewhere. For example, the Joint Economic Forecast was set up independently within the context of the Forecasting Act (EgVG) to review economic forecasts as part of the federal government’s budgetary and financial planning.

115 Cf. Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2020).

116 Cf. Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2020).

is formulated without any regard for shifts in the economy. This is not viable in a recession, as aiming for “black zero” results in a procyclical fiscal policy, which can have serious negative repercussions.

Other potential courses of action: The German Parliament decided to enact the constitutional emergency clause to suspend the “debt brake” in 2020 and 2021. This means that the federal government is not bound by the structural deficit upper limit (taking into account shifts in the economy) of 0.35% of the GDP during this time. This was the right decision given that the lost income and increased spending brought about by the pandemic would have made it impossible to roll out support measures otherwise. As a result, the federal government’s structural deficit is expected to sit above 5% of the GDP in 2021.[117]

Projections set out in the German Stability Programme published in April 2021 for the whole country (federal government, states, local authorities, social welfare systems) suggest that structural deficits will be on the decline in the medium term. A structural deficit of around 2.75% is predicted for the entire country in 2022, with the figure dropping to around 1.25% in 2023 and 0.5% in 2024.[118]

In the medium and long term, the federal government and states must also factor in their repayments for the additional borrowing under the exemption clauses into their budget plans. Repayment is governed by budgetary provisions or state legal regulations and is usually required within a reasonable time frame.[119] Where funds have been borrowed in order to respond to the COVID-19 pandemic, long repayment terms will reduce the pressure to consolidate each year whilst repayments are being made.

The point at which it makes sense to reinstate the “debt brake” and European fiscal regulations as normal depends largely on the strength and speed of the economic recovery, which is in turn dependent on the support measures taken by the government. Given the comparatively slow progress of the vaccine rollout in Germany, and indeed across the whole of the EU, it may be meaningful to extend the emergency clauses to 2022 if this would help counter economic risks and contribute towards the speedy recovery of the economy in Europe.

117 Cf. Bundesministerium der Finanzen (2021)c, Table 2.

118 There is no separate projection for the federal government’s structural fiscal balance in the Stability Programme. The federal government’s unadjusted fiscal balance, without taking into account economic shifts, is estimated at -1% of the GDP for 2023 (cf. Bundesministerium der Finanzen (2021)).

119 Cf. ifo Institute (2020).

5.3 Municipal finances and investments

5.3.1 Analysis

Municipal finances were already in crisis before the pandemic – at least in areas of Germany that were quite negatively impacted by the economic development and structural changes of recent decades. The crisis affecting municipal finances goes back a long way, with its roots in the tax reform in the year 2000 that saw a reduction in the rate of corporate income tax. Along the way, the situation has been exacerbated by the municipalities' contributions to the costs of social policy passed by the federal government (e.g. housing costs covered by unemployment benefits 'Arbeitslosengeld II') and the fact that some states have not always been willing to fulfil their duty to provide the municipalities with the necessary funding.[120]

As was also the case with the refugee crisis, the COVID-19 pandemic has put additional strain on municipalities without the proper compensation being provided, both then and now. Examples include the loss of income from public transport, the additional pressure faced by the local health authorities and the costs of switching from classroom teaching to home schooling using digital means of communication. In the past, regular financial freezes on municipalities led to declines in local investments that were often not even offset by depreciation.[121] Whenever shortfalls in public investment are a topic of public discussion, it is always the municipalities that are found to be suffering the most. That is why it is so important to avoid similar outcomes this time around that would block municipal investments even further.

Municipalities have been severely affected by the consequences of the COVID-19 pandemic.[122] The fiscal balance of the municipalities may have only been slightly negative overall in 2020, but there are stark discrepancies at play here that must not be overlooked. Federal government compensation for lost corporate income tax in the local authorities in 2020 was a huge source of support. Yet, this raises the question of how the municipalities can be provided with sufficient funding in the next few years. This question is all the more important when you factor in existing debts (some of which are sizeable) and a lack of municipal investment.

Unlike the federal government and states, municipalities can finance investments with borrowing provided that they can guarantee their financial sustainability; they are not

120 Cf. Deutsche Bundesbank (2016); Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie (2020).

121 Cf. Arnold et al. (2015).

122 Camarero Garcia et al. (2020) describe the regional differences in economic resilience that already existed before the COVID-19 pandemic and the vulnerability to crisis situations exacerbated by the pandemic.

subject to “debt brake” regulations. A significant proportion of public debt taken out by municipalities, however, is in the form of cash credits (“Kassenkredite”), which can only be used to cover spending over the course of a financial year according to the states’ budgetary provisions. Yet, cash credits have still been used to finance spending not related to investments, which goes against budgetary provisions. Nevertheless, this has often been tolerated by the relevant supervisory authorities.[123]

It is often the case in municipalities that substantial debt and a lack of investment correlate with high social welfare expenditures.[124] Social spending tends to be determined by laws enacted by the federal government and states. Even if the federal government provides more compensation for this spending in line with the principle of connectivity, according to which administrative and financial responsibility go hand in hand, there are several indications for implementing the principle more strictly going forward. The government recently committed to covering a larger proportion of jobseekers’ housing costs as part of the COVID-19 legislation, which appears meaningful under these circumstances.

5.3.2 Potential courses of action

The problem of legacy debt on the part of municipalities needs resolving if all municipalities are to be back in a position to take action. The federal states have responsibility first and foremost here given that funding the municipalities falls under their remit. Municipality debt relief programmes rolled out by the states have seen success but need to be structured such that investments by affected municipalities do not suffer setbacks caused by consolidation.[125] Due to the economic development driven by globalisation, some states have difficulty providing their municipalities with sufficient funding because they are struggling with financial bottlenecks of their own. In such cases, regional economic funding programmes provided by the federal government and the EU could be called upon to drive an economic transformation and improve the finances of states and their municipalities in the long term.

123 Cf. Deutsche Bundesbank (2016).

124 Cf. Arnold et al. (2015).

125 Cf. Boettcher et al. (2018).

5.4 European fiscal policy

5.4.1 Analysis

A key challenge facing Europe over the next decade will be to bring about and sustain more dynamic growth than over the past ten years. If productivity is to be increased, opportunities must be seized that allow for structural change. In many countries, this will require structural reforms and investments in digital infrastructure and elsewhere. it is also necessary to fully establish the banking and capital market union and an economic policy that supports growth without neglecting the environment and sustainability.[126] A shift in the focus of the EU budget towards European public assets would be just as important as the Next Generation EU fund (NGEU), which was only set up as a temporary measure to deal with the fallout from the COVID-19 pandemic. There is no scope for making it permanent.[127]

The NGEU has undoubtedly demonstrated and reinforced solidarity within the EU during the pandemic. The contrast between the 750 billion euros available in the fund and the 3 billion euros spent by the Commission on the procurement of vaccines is striking. Yet, there are still some important unanswered questions regarding its structure and implementation. Above all, it is unclear whether the funds will actually be used to further the structural change required to transition to a climate-neutral energy system and encourage growth or whether funded measures will instead tend to be aimed at maintaining the existing structures.[128]

The COVID-19 pandemic has had a negative impact on the state of public finances in Europe. In 2020, the budget deficit in the eurozone amounted to 7.2% of the GDP, and the level of debt increased to 100% of the GDP.[129] The Deutsche Bundesbank is anticipating a similar deficit and a slightly higher level of debt in 2021. Having said that, the debt situation does vary significantly between member states, ranging from moderate double-digit figures in Estonia and Luxembourg to figures in excess of 200% of the GDP in Greece.

All of this raises questions regarding the implications of a fiscal constitution within the EU. The fiscal regulations have been suspended for now and a return to the old regulations is not expected in 2022 either. One the one hand, it is important to consider the significance of stabilisation policies in the short term. On the other hand, there

126 Cf. Heinemann (2018); Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (2020).

127 Cf. the decision of the German Federal Constitutional Court (2021) on the application for the issue of a temporary injunction: BVerfG, Decision of the Second Senate on 15 April 2021 – 2 BvR 547/21 -, Rn. 1–112.

128 Cf. Dorn & Fuest (2021).

129 Cf. Deutsche Bundesbank (2021).

are underlying questions concerning whether the reference debt value of up to 60% of the GDP as specified in the Maastricht Treaty is still up to date, considering that it was determined under very different macroeconomic circumstances. The same goes for the relevance of guidelines on reducing the amount of debt.

Ways of modifying the fiscal regulations are being discussed at the European level.[130] Whilst it is becoming clear that insufficient government investment activity at the national level is one problem, other issues are being raised too, such as high levels of complexity, a lack of enforcement and the procyclical nature of the regulations. Particularly in times of economic strength, as it was in 2019, a whole slew of member states have been viewed as being in breach of the preventive arm of the Stability and Growth Pact, in part due to insufficient repayment of debt (where it was over 60% of the GDP) and a sharp increase in spending (despite spending on investments only rising slightly).

The EU also has only limited permanent fiscal capacities and institutions that can have a stabilising effect in a crisis situation. The European Stability Mechanism (ESM) may be able to help stabilise the EU member states through loans and guarantees, but the use of lines of credit is heavily regulated and the ESM has no fiscal capacity of its own.

5.4.2 Potential courses of action

Fiscal policy can play an important role in a speedy post-pandemic recovery process since according to recent research it should boost growth given the current low interest rates.[131] Swift recovery in Europe should likely have positive knock-on effects on German exports. Germany could make an important contribution by working towards the establishment of effective monitoring processes and by thoroughly evaluating NGEU measures. The country should also exemplify this decisive approach to the critical evaluation of economic policy measures at the national level. Inspiration could come from the evaluation of the impact of national fiscal programmes, including the assessment of what happens when such programmes come to an end. Existing evaluation frameworks at the European level could provide a foundation here.[132]

130 Cf. European Fiscal Board (2020)a.

131 Cf. Christiano et al. (2011); Farhi & Werning (2016); Woodford (2011).

132 Cf. European Commission Directorate General for Regional and Urban Policy (2015).

There is a good case for waiting two or three years before reintroducing the fiscal regulations. When the time comes to consider a new European fiscal regime, it could be helpful to focus on realistic fiscal regulations with better incentives to overcome structural weaknesses. Until that point, stabilisation at the macroeconomic level should likely be the priority.[133]

A reform of the fiscal regulations is also up for discussion at the European level, similar to Germany's. The fiscal regulations include the Stability and Growth Pact (limiting the overall deficit to 3% and placing an upper limit of 60% of the GDP on the debt ratio) and the 2013 Fiscal Compact, which normally places an upper limit of 0.5% on the overall structural deficit. This reform debate is not only important for Germany because the European regulations apply to Germany, but also because the German and European regulatory frameworks need to be compatible.

For example, replacing the "debt brake" with the Golden Rule would be problematic if European regulations did not allow for investments to be financed with borrowing. Furthermore, the upper limits for net borrowing by the federal government and states under the "debt brake" need to be compatible with the upper limits on deficits set out by the European regulations. Therefore, in the case of potential fiscal regulation reforms in Germany and Europe, close coordination should be pursued.

Suggestions for reforming the European regulations include the introduction of a spending rule linking the adjusted expenditure growth permitted to the growth of production potential.[134] Expenditure growth would be limited for a period of three years, meaning that short-term adjustments would not need to be made to account for temporary fluctuations. At the same time, it would be advisable to strengthen independent national fiscal institutions with a view to ensuring better compliance with the regulations.[135] When evaluating this and other suggested reforms, it would be expedient to ensure that the regulations are coherent. This will allow them to be used and implemented effectively and likewise enable the specification of realistic and economically viable targets.

Reforms of the European fiscal regulations should align with the institutional framework of finance and economic policy within the EU. Clear, credible fiscal regulations combined with the disciplinary effect of the credit markets via the interest rates could encourage reforms in individual member states and guarantee the sustainability of

133 Cf. Blanchard et al. (2020); European Fiscal Board (2020)b.

134 Cf. European Fiscal Board (2020)b.

135 In Germany, the Stability Council and its independent advisory board take on this supervisory function. The Joint Economic Forecast plays an important role in the review of the federal government's economic and fiscal projections on the basis of the Forecasting Act.

public finances. Improved risk distribution measures across EU member states can help insure against asymmetric shocks.[136] This could be achieved by establishing a European unemployment insurance, which would need to be designed to avoid permanent transfer payments to specific countries, though.[137]

136 Cf. Bénassy-Quéré et al. (2018).

137 Cf. Dolls et al. (2018).

6 References[138]

Abbey, E. J., Khalifa, B. A. A., Oduwole, M. O., Ayeh, S. K., Nudotor, R. D., Salia, E. L., Lasisi, O., Bennett, S., Yusuf, H. E., Agwu, A. L., & Karakousis, P. C. (2020). The Global Health Security Index is not predictive of COVID-19 pandemic responses among Organization for Economic Cooperation and Development countries. *PLOS ONE, 15*(10), e0239398. https://doi.org/10.1371/journal.pone.0239398

Achleitner, A.-K., Braun, R., Behrens, J. H., & Lange, T. (2019). *Innovationskraft in Deutschland verbessern: Ökosystem für Wachstumsfinanzierung stärken (Enhancing Innovation in Germany by Strengthening the Growth Finance Ecosystem)* (SSRN Scholarly Paper ID 3480557). Social Science Research Network. https://papers.ssrn.com/abstract=3480557

Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2020). *Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys* (Nr. 13183; IZA Discussion Papers). Institute of Labor Economics (IZA).

Agostinelli, F., Doepke, M., Sorrenti, G., & Zilibotti, F. (2020). *When the Great Equalizer Shuts Down: Schools, Peers, and Parents in Pandemic Times* (Nr. w28264; p. w28264). National Bureau of Economic Research. https://doi.org/10.3386/w28264

Akcigit, U., Dinlersoz, E., Greenwood, J., & Penciakova, V. (2019). *Synergizing Ventures* (Nr. 26196; NBER Working Papers). National Bureau of Economic Research, Inc.

Akcigit, U., Grigsby, J., Nicholas, T., & Stantcheva, S. (2018). *Taxation and Innovation in the 20th Century* (Nr. 24982; NBER Working Papers). National Bureau of Economic Research, Inc.

Alesina, A., & Passalacqua, A. (2016). The Political Economy of Government Debt. In J. B. Taylor & H. Uhlig (eds.), *Handbook of Macroeconomics* (1. ed., vol. 2, pp. 2599–2651). Elsevier.

Alon, T., Coskun, S., Doepke, M., Koll, D., & Tertilt, M. (2021). *From Mancession to Shecession: Women's Employment in Regular and Pandemic Recessions* (Nr. 28632; NBER Working Papers). National Bureau of Economic Research, Inc.

Alon, T., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020). *The Impact of COVID-19 on Gender Equality* (CRC TR 224 Discussion Paper Series). University of Bonn and University of Mannheim, Germany.

Alstadsæter, A., Bratsberg, B., Eielsen, G., Kopczuk, W., Markussen, S., Raaum, O., & Røed, K. (2020). *The First Weeks of the Coronavirus Crisis: Who Got Hit, When and Why? Evidence from Norway* (Nr. w27131; p. w27131). National Bureau of Economic Research. https://doi.org/10.3386/w27131

Andrew, A., Cattan, S., Dias, M. C., Farquharson, C., Kraftman, L., Krutikova, S., Phimister, A., & Sevilla, A (17 August 2020). *Inequalities in children's experiences of home learning during the COVID-19 lockdown in England.* https://www.ifs.org.uk/publications/14975

Arnold, F., Freier, R., Geissler, R., & Schrauth, P. (2015). Große regionale Disparitäten bei den kommunalen Investitionen. *DIW Wochenbericht, 43,* 1031–1040.

Atkeson, A., & Kehoe, P. J. (2007). Modeling the Transition to a New Economy: Lessons from Two Technological Revolutions. *American Economic Review, 97*(1), 64–88. https://doi.org/10.1257/aer.97.1.64

Bach, S., Fischer, B., Haan, P., & Wrohlich, K. (2020). Reform des Ehegattensplittings: Realsplitting mit niedrigem Übertragungsbetrag ist ein guter Kompromiss. *DIW Wochenbericht, 87*(41), 785–794.

Bacher-Hicks, A., Goodman, J., & Mulhern, C. (2021). Inequality in household adaptation to schooling shocks: Covid-induced online learning engagement in real time. *Journal of Public Economics, 193,* 104345. https://doi.org/10.1016/j.jpubeco.2020.104345

Bai, C.-E., Hsieh, C.-T., & Song, Z. (Michael). (2016). The Long Shadow of China's Fiscal Expansion. *Brookings Papers on Economic Activity, 47*(2 (Fall)), 129–181.

Baldwin, R. E., & Robert-Nicoud, F. (2007). Entry and Asymmetric Lobbying: Why Governments Pick Losers. *Journal of the European Economic Association, 5*(5), 1064–1093. https://doi.org/10.1162/JEEA.2007.5.5.1064

Banerjee, R., Illes, A., Kharroubi, E., & Garralda, J. M. S. (2020). *Covid-19 and corporate sector liquidity* (Nr. 10; BIS Bulletins). Bank for International Settlements.

138 All links in the reference list were last accessed on 5 July 2021.

Barbiero, F., Popov, A., & Wolski, M. (2020). Debt overhang, global growth opportunities, and investment. *Journal of Banking & Finance, 120*(C). https://doi.org/10.1016/j.jbankfin.2020.105950

Bauernschuster, S., & Schlotter, M. (2015). Public child care and mothers' labor supply—Evidence from two quasi-experiments. *Journal of Public Economics, 123*(C), 1–16.

Bayer, C., Born, B., Luetticke, R., & Müller, G. J. (2020). *The Coronavirus Stimulus Package: How Large is the Transfer Multiplier?* (SSRN Scholarly Paper ID 3594222). Social Science Research Network. https://papers.ssrn.com/abstract=3594222

Bénassy-Quéré, A., Brunnermeier, M., Enderlein, H., Farhi, E., Fratzscher, M., Fuest, C., Gourinchas, P.-O., Martin, P., Pisani-Ferry, J., Rey, H., Schnabel, I., Véron, N., Weder di Mauro, B., & Zettelmeyer, J. (2018). Reconciling risk sharing with market discipline: A constructive approach to euro area reform. *CEPR Policy Insight, 91,* 24.

Bertoni, F., Colombo, M. G., Quas, A., & Tenca, F. (2019). The changing patterns of venture capital investments in Europe. Economia e Politica Industriale: *Journal of Industrial and Business Economics, 46*(2), 229–250.

Bertoni, F., Colombo, M., & Quas, A. (2015). The patterns of venture capital investment in Europe. *Small Business Economics, 45*(3), 543–560.

Beznoska, M., Niehues, J., & Stockhausen, M. (2020). *Stabil durch die Krise? Verteilungsfolgen der Corona-Pandemie – eine Mikrosimulationsanalyse* (Nr. 65; IW-Report, p. 43)

Bick, A., & Blandin, A. (2020). Real-Time Labor Market Estimates During the 2020 Coronavirus Outbreak. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.3692425

Blanchard, O., Leandro, A., & Zettelmeyer, J. (8 October 2020). Fiscal standards for Europe. *Economic Policy.* https://www.economic-policy.org/72nd-economic-policy-panel/fiscal-standards-for-europe/

Blesse, S., Heinemann, F., Janeba, E., & Nover, J. (2021). *Landtagspolitiker stehen zur Schuldenbremse bei wachsender Unterstützung für Investitionsklausel* (Nr. 21–01; ZEW-Kurzexpertise). https://ftp.zew.de/pub/zew-docs/ZEWKurzexpertisen/ZEW_Kurzexpertise2101.pdf

Bloom, N., Griffith, R., & van Reenen, J. (2002). Do R&D tax credits work? Evidence from a panel of countries 1979-1997. *Journal of Public Economics, 85*(1), 1–31.

Bloom, N., Schankerman, M., & Reenen, J. V. (2013). Identifying Technology Spillovers and Product Market Rivalry. *Econometrica, 81*(4), 1347–1393. https://doi.org/10.3982/ECTA9466

Bloom, N., Van Reenen, J., & Williams, H. (2019). A Toolkit of Policies to Promote Innovation. *Journal of Economic Perspectives, 33*(3), 163–184. https://doi.org/10.1257/jep.33.3.163

Boettcher, F., Freier, R., Geißler, R., & Niemann, F.-S. (2018). Konsolidierungsprogramme der Länder für finanzschwache Kommunen. *Wirtschaftsdienst, 98*(8), 592–599. https://doi.org/10.1007/s10273-018-2336-1

Bofinger, P., Feld, L. P., Fratzscher, M., Fuest, C., Gründler, K., Hüther, M., Kriwoluzky, A., Michelsen, C., Potrafke, N., & Reuter, W. H. (2019). Schuldenbremse – Investitionshemmnis oder Vorbild für Europa? *Wirtschaftsdienst, 2019*(5), 307–329.

Bøler, E. A., Moxnes, A., & Ulltveit-Moe, K. H. (2015). R&D, International Sourcing, and the Joint Impact on Firm Performance. *American Economic Review, 105*(12), 3704–3739. https://doi.org/10.1257/aer.20121530

Börsch-Supan, A., & Rausch, J. (2021). *Lassen sich Haltelinien, finanzielle Nachhaltigkeit und Generationengerechtigkeit trotz der Corona-Pandemie miteinander verbinden? | Munich Center for the Economics of Aging – MEA* (MEA Discussion Papers). https://www.mpisoc.mpg.de/sozialpolitik-mea/publikationen/detail/publication/lassen-sich-haltelinien-finanzielle-nachhaltigkeit-und-generationengerechtigkeit-trotz-der-corona-pandemie-miteinander-verbinden/

Breyer, F., & Lorenz, N. (2020). Wie nachhaltig sind die gesetzliche Kranken- und Pflegeversicherung finanziert? *Wirtschaftsdienst, 100*(8), 591–596. https://doi.org/10.1007/s10273-020-2716-1

Bruckmeier, K., Peichl, A., Popp, M., Wiemers, J., & Wollmershäuser, T. (2020). Covid-19-Krise: Für das Jahr 2020 ist mit keinem Anstieg der Einkommensungleichheit in Deutschland zu rechnen. *ifo Schnelldienst digital, 16,* 5.

Brüggmann, D. (2020). Women's employment, income and divorce in West Germany: a causal approach. *Journal for Labour Market Research, 54*(1), 5. https://doi.org/10.1186/s12651-020-00270-0

Brunner, B., & Kuhn, A. (2014). The impact of labor market entry conditions on initial job assignment and wages. *Journal of Population Economics, 27*(3), 705–738. https://doi.org/10.1007/s00148-013-0494-4

Brynjolfsson, E., Rock, D., & Syverson, C. (2021). The Productivity J-Curve: How Intangibles Complement General Purpose Technologies. *American Economic Journal: Macroeconomics, 13*(1), 333–372. https://doi.org/10.1257/mac.20180386

Bührle, A. T. (2021). *Do tax loss restrictions distort venture capital funding of start-ups?* (Working Paper Nr. 21–008). ZEW Discussion Papers.

Bundesamt für Bevölkerungsschutz und Katastrophenhilfe. (2013). Bericht zur Risikoanalyse im Bevölkerungsschutz 2012. Bundesamt für Bevölkerungsschutz und Katastrophenhilfe. https://www.kritis.bund.de/SharedDocs/Downloads/BBK/DE/Downloads/Krisenmanagement/BT-Bericht_Risikoanalyse_im_BevSch_2012.pdf;jsessionid=A724EF57B2A860254D5E7BAA89E4AF15.1_cid509?__blob=publicationFile

Bundesministerium der Finanzen. (2021a). *Deutsches Stabilitätsprogramm 2021*. https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/stabilitaetsprogramm-2021.pdf?__blob=publicationFile&v=8

Bundesministerium der Finanzen. (2021b). *Entwicklung der öffentlichen Finanzen*. Bundesministerium der Finanzen. https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Entwicklung_Oeffentliche_Finanzen/entwicklung-oeffentliche-finanzen.html

Bundesministerium der Finanzen. (2021c). *Sollbericht 2021: Ausgaben und Einnahmen des Bundeshaushalts - Bundesfinanzministerium - BMF-Monatsbericht Februar 2021*. https://www.bundesfinanzministerium.de/Monatsberichte/2021/02/Inhalte/Kapitel-3-Analysen/3-2-sollbericht-2021.html

Bundesministerium für Wirtschaft und Energie. (2019). *Nationale Industriestrategie 2030* (p. 20). https://www.bmwi.de/Redaktion/DE/Publikationen/Industrie/nationale-industriestrategie-2030.pdf%3F__blob%3DpublicationFile%26v%3D10

Bundesregierung. (2021). *Datenstrategie der Bundesregierung* (p. 122). https://www.bundesregierung.de/resource/blob/992814/1845634/f073096a398e59573c7526feaadd43c4/datenstrategie-der-bundesregierung-download-bpa-data.pdf?download=1

Cakmakli, C., Demiralp, S., Kalemli-Ozcan, S., Yesiltas, S., & Yildirim, M. (2021). *The Economic Case for Global Vaccinations: An Epidemiological Model with International Production Networks*.

Caliendo, M., Künn, S., & Uhlendorff, A. (2016). Earnings exemptions for unemployed workers: The relationship between marginal employment, unemployment duration and job quality. *Labour Economics, 42*(C), 177–193.

Camarero Garcia, S., Janeba, E., Siegloch, S., Ungerer, M., Wambach, A., Kühl, C., & Scheller, H. (2020). Kommunale Antworten auf die globale Corona-Krise: Finanzen, Innovationskraft und Lebensqualität verbessern. Kurzexpertise im Auftrag des Deutschen Städtetages. 17 Juli 2020. 25. https://repository.difu.de/jspui/handle/difu/577753

Cengiz, F., Schratzenstaller, M., Franceschelli, N., & González, M. S. (2019). *Gender Responsive EU Budgeting. Update of the study 'The EU Budget for Gender Equality' and review of its conclusions and recommendations* (p. 50). https://www.europarl.europa.eu/RegData/etudes/STUD/2019/621801/IPOL_STU(2019)621801_EN.pdf

Césu. (2021). *Casual Labour in France - France. Angloinfo*. http://www.angloinfo.com/how-to/france/working/employment/casual-labour

Chen, Z., Liu, Z., Suárez Serrato, J. C., & Xu, Y. (2018). *Notching R&D Investment with Corporate Income Tax Cuts in China* (NBER Working Paper Nr. 24749). National Bureau of Economic Research, Inc.

Chetty, R., Friedman, J., Hendren, N., Stepner, M., & Team, T. O. I. (2020). How Did COVID-19 and Stabilization Policies Affect Spending and Employment? A New Real-Time Economic Tracker Based on Private Sector Data The Economic Impacts of COVID-19: Evidence from a New Public Database Built Using Private Sector Data (NBER Working Paper Nr. 27431 Nr. w27431; p. w27431). National Bureau of Economic Research. https://doi.org/10.3386/w27431

Christiano, L., Eichenbaum, M., & Rebelo, S. (2011). When Is the Government Spending Multiplier Large? *Journal of Political Economy, 119*(1), 78–121. https://doi.org/10.1086/659312

Cimoli, M., Dosi, G., & Stiglitz, J. E. (2008). *The Future of Industrial Policies in the New Millennium: Toward a Knowledge-Centered Development Agenda* (2008/19; LEM Papers Series). Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies, Pisa, Italy.

Cochrane, J. H. (2021, January 11). The Grumpy Economist: Low Interest Rates and Government Debt. *The Grumpy Economist*. https://johnhcochrane.blogspot.com/2021/01/low-interest-rates-and-government-debt.html

Collischon, M., Cygan-Rehm, K., & Riphahn, R. T. (2020). Employment effects of payroll tax subsidies. *Small Business Economics*. https://doi.org/10.1007/s11187-020-00344-w

Colombo, M. G., Cumming, D. J., & Vismara, S. (2016). Governmental venture capital for innovative young firms. *The Journal of Technology Transfer, 41*(1), 10–24. https://doi.org/10.1007/s10961-014-9380-9

Cremer, G. (2021). Sozial ist, was stark macht. Warum Deutschland eine Politik der Befähigung braucht und was sie leistet. Herder.

Cunha, F., & Heckman, J. (2007). The Technology of Skill Formation. *American Economic Review, 97*(2), 31–47. https://doi.org/10.1257/aer.97.2.31

Curtis, E. M., Board of Governors of the Federal Reserve System (U.S.), & Decker, R. A. (2018). Entrepreneurship and State Taxation. *Finance and Economics Discussion Series, 2018*(003). https://doi.org/10.17016/FEDS.2018.003

Dechezleprêtre, A., Einiö, E., Martin, R., Nguyen, K.-T., & Reenen, J. V. (2016). *Do Tax Incentives for Research Increase Firm Innovation? An RD Design for R&D* (Nr. dp1413; CEP Discussion Papers). Centre for Economic Performance, LSE.

Decker, R., Haltiwanger, J., Jarmin, R., & Miranda, J. (2014). The Role of Entrepreneurship in US Job Creation and Economic Dynamism. *Journal of Economic Perspectives, 28*(3), 3–24. https://doi.org/10.1257/jep.28.3.3

Demmou, L., Calligaris, S., Franco, G., Dlugosch, D., McGowan, M. A., & Sakha, S. (2021). *Insolvency and debt overhang following the COVID-19 outbreak: Assessment of risks and policy responses*. https://doi.org/10.1787/747a8226-en

Dent, R. C., Karahan, F., Pugsley, B., & Şahin, A. (2016). The Role of Startups in Structural Transformation. *American Economic Review, 106*(5), 219–223. https://doi.org/10.1257/aer.p20161053

D'Erasmo, P., Mendoza, E. G., & Zhang, J. (2016). What is a Sustainable Public Debt? In J. B. Taylor & H. Uhlig (eds.), *Handbook of Macroeconomics* (1. ed., vol. 2, pp. 2493–2597). Elsevier.

Deutsche Bundesbank. (2016). Gemeindefinanzen: Entwicklungen und ausgewählte Aspekte. *Monatsbericht, 68*(10), 13–36.

Deutsche Bundesbank. (2019). Monatsbericht – April 2019. *Monatsbericht, 71*(4), 79–93.

Deutsche Bundesbank. (2021). Monatsbericht – May 2021. *Monatsbericht, 73*(5), 170.

Devereux, M. P., Güçeri, İ., Simmler, M., & Tam, E. H. F. (2020). Discretionary Fiscal Responses to the Covid-19 Pandemic. *Oxford Review of Economic Policy*. https://doi.org/10.1093/oxrep/graa019

Dharmapala, D. (2014). What Do We Know about Base Erosion and Profit Shifting? A Review of the Empirical Literature. *Fiscal Studies, 35*(4), 421–448. https://doi.org/10.1111/j.1475-5890.2014.12037.x

Dolls, M., Fuest, C., Neumann, D., & Peichl, A. (2018). An unemployment insurance scheme for the euro area? A comparison of different alternatives using microdata. *International Tax and Public Finance, 25*(1), 273–309.

Dorn, F., & Fuest, C. (2021). Next Generation EU: Chancen und Risiken des europäischen Fonds für die wirtschaftliche Erholung nach der Corona-Krise. *Wirtschaftsdienst, 2021*(2), 78–81.

Dullien, S., & Kohlrausch, B. (2021). *Dissecting the COVID19 supply shock: Which role did school closures play?* (Nr. 207–2021; IMK Working Paper). IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.

Dustmann, C., Ludsteck, J., & Schönberg, U. (2009). Revisiting the German Wage Structure. *The Quarterly Journal of Economics, 124*(2), 843–881. https://doi.org/10.1162/qjec.2009.124.2.843

Engzell, P., Frey, A., & Verhagen, M. D. (2020). *Learning Loss Due to School Closures During the COVID-19 Pandemic*. SocArXiv. https://doi.org/10.31235/osf.io/ve4z7

European Commission Directorate General for Regional and Urban Policy. (2015). *Guidance document on monitoring and evaluation: European cohesion policy,* ERDF: concepts and recommandations. Publications Office. https://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf (Stand: 14.07.2021).

European Commission. (2016). *Women in the labour market* (European Semester Thematic Factsheet). https://ec.europa.eu/info/sites/info/files/european-semester_thematic-factsheet_labour-force-participation-women_en_0.pdf

European Commission. (2020). *Debt sustainability monitor 2019*. Publications Office. https://data.europa.eu/doi/10.2765/33470

European Fiscal Board. (2020a). *2020 annual report* [Text]. https://ec.europa.eu/info/sites/default/files/efb_annual_report_2020_en_1.pdf

European Fiscal Board. (2020b). *Assessment of the fiscal stance appropriate for the euro area in 2021* (p. 36.) https://ec.europa.eu/info/sites/info/files/2020_06_25_efb_assessment_of_euro_area_fiscal_stance_en.pdf

Expertenkommission Forschung und Innovation. (2019). *Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands 2019* [Research Report]. https://www.e-fi.de/fileadmin/Assets/Gutachten/EFI_Gutachten_2019.pdf

Expertenkommission Forschung und Innovation. (2020). *Kleine und mittlere Unternehmen unterstützen* (Policy Brief Nr. 04; Policy Brief). https://www.e-fi.de/fileadmin/Assets/Policy_Briefs/EFI_PolicyBrief_04_2020.pdf

Farhi, E., & Werning, I. (2016). A Theory of Macroprudential Policies in the Presence of Nominal Rigidities. Econometrica, 84(5), 1645–1704. https://doi.org/10.3982/ECTA11883

Federal Reserve Bank of Dallas. (20 March 2021). *About the Weekly Economic Index*. https://www.dallasfed.org:443/research/rps/about

Feld, L. P., & Heckemeyer, J. H. (2011). Fdi and Taxation: A Meta-Study. *Journal of Economic Surveys, 25*(2), 233–272. https://doi.org/10.1111/j.1467-6419.2010.00674.x

Fitzenberger, B., Schnabel, R., & Wunderlich, G. (2004). The gender gap in labor market participation and employment: A cohort analysis for West Germany. *Journal of Population Economics, 17*(1), 83–116. https://doi.org/10.1007/s00148-003-0141-6

Frodermann, C., Wrohlich, K., & Zucco, A. (2020). *Parental leave reform and long-run earnings of mothers* (Nr. 202009; IAB Discussion Paper). Institut für Arbeitsmarkt- und Berufsforschung (IAB), Nürnberg [Institute for Employment Research, Nuremberg, Germany].

Fuchs-Schündeln, N., Krueger, D., Ludwig, A., & Popova, I. (2020). *The Long-Term Distributional and Welfare Effects of Covid-19 School Closures* (Nr. 15227; CEPR DP)

García-Manjón, J. V., & Romero-Merino, M. E. (2012). Research, development, and firm growth. Empirical evidence from European top R&D spending firms. *Research Policy, 41*(6), 1084–1092.

Garrett, D. G., Ohrn, E., & Suárez Serrato, J. C. (2020). Tax Policy and Local Labor Market Behavior. *American Economic Review: Insights, 2*(1), 83–100. https://doi.org/10.1257/aeri.20190041

Goldin, C. (2014). A Grand Gender Convergence: Its Last Chapter. *American Economic Review, 104*(4), 1091–1119. https://doi.org/10.1257/aer.104.4.1091

Greenwald, B., & Stiglitz, J. E. (2013). Industrial Policies, the Creation of a Learning Society, and Economic Development. In J. E. Stiglitz & J. Y. Lin (eds.), *The Industrial Policy Revolution I: The Role of Government Beyond Ideology* (pp. 43–71). Palgrave Macmillan UK. https://doi.org/10.1057/9781137335173_4

Grewenig, E., Lergetporer, P., & Werner, K. (2020). *Gender Norms and Labor-Supply Expectations: Experimental Evidence from Adolescents* (Nr. 8611; CESifo Working Paper Series). CESifo.

Groll, D. (2015). Mindestlohn: erste Anzeichen für Jobverluste. *Wirtschaftsdienst, 2015*(6), 439–440.

Guceri, I., & Albinowski, M. (2019). *Investment Responses to Tax Policy Under Uncertainty* (Working Paper Nr. 7929). CESifo Working Paper.

Guceri, I., & Liu, L. (2019). Effectiveness of Fiscal Incentives for R&D: Quasi-experimental Evidence. *American Economic Journal: Economic Policy, 11*(1), 266–291. https://doi.org/10.1257/pol.20170403

Hagedorn, M., Manovskii, I., & Mitman, K. (2019). *The Fiscal Multiplier* (Nr. w25571). National Bureau of Economic Research. https://doi.org/10.3386/w25571

Hall, B., & Lerner, J. (2010). The Financing of R&D and Innovation. In B. H. Hall & N. Rosenberg (eds.), *Handbook of The Economics of Innovation* (pp. 609–639). Elsevier. https://econpapers.repec.org/bookchap/eeehaechp/v1_5f609.htm

Hans-Böckler-Stiftung. (2020). *Pressedienst 29.12.2020 Neue Ergebnisse der Böckler Erwerbspersonenbefragungm_wsi_2020_12_14.pdf.* https://www.boeckler.de/pdf/pm_wsi_2020_12_14.pdf

Hanushek, E. A., & Wößmann, L. (2020). *The economic impacts of learning losses* (Nr. 225; OECD Education Working Papers). OECD Publishing.

Hausmann, R., & Rodrik, D. (2003). Economic development as self-discovery. *Journal of Development Economics, 72*(2), 603–633.

Heinemann, F. (2018). Verhandlungen zum Mehrjährigen Finanzrahmen der EU: »Europäischer Mehrwert« und Einhaltung rechtsstaatlicher Prinzipien: Diskussion um Neuausrichtung der EU-Haushaltspolitik. *ifo Schnelldienst, 71(12), 3–26.*

Heinrich-Böll-Stiftung. (2020). *Weiterbildung 4.0 – Wie weit trägt die Nationale Weiterbildungsstrategie?* [Positionspapier auf Basis der gleichnamigen Fachkonferenz]. Heinrich-Böll-Stiftung. https://www.boell.de/sites/default/files/2020-04/Positionspapier-Weiterbildung-40_0.pdf?dimension1=division_bw/EN

Heß, P., Janssen, S., & Leber, U. (2019). *Digitalisierung und berufliche Weiterbildung: Beschäftigte, deren Tätigkeiten durch Technologien ersetzbar sind, bilden sich seltener weiter* (Research Report 16/2019). IAB-Kurzbericht.

Hey, J. (2011). Perspektiven der Unternehmensbesteuerung: Gewerbesteuer – Gruppenbesteuerung – Verlustverrechnung – Gewinnermittlung. *StuW, 2,* 131–143.

Holtfrerich, C.-L., Feld, L. P., Heun, W., Illing, G., Kirchgässner, G., Kocka, J., Schularick, M., Streeck, W., Wagschal, U., Walter, S., & von Weizsäcker, C. C. (2015). *Staatsschulden: Ursachen, Wirkungen und Grenzen* [Bericht]. https://www.leopoldina.org/uploads/tx_leopublication/3Akad_Bericht_Staatsschulden_2015.pdf

Hüther, M., & Südekum, J. (2020). *How to re-design German fiscal policy rules after the COVID19 pandemic* (25/2020; IW Policy Papers). Institut der deutschen Wirtschaft (IW) / German Economic Institute.

Hutter, C., & Weber, E. (2020). Corona-Krise: die transformative Rezession. *Wirtschaftsdienst, 2015*(6), 429–431.

ifo Institute. (2020). *Schuldenbremse in den Bundesländern - Stand: 9 November 2020* (p. 17). https://www.ifo.de/sites/default/files/2020-04/Corona-Schuldenbremse-2020.pdf

Jahn, E. J., & Oberfichtner, M. (2020). *Freiwillige Arbeitslosenversicherung: nur wenige Selbstständige versichern sich gegen die Folgen von Arbeitslosigkeit.* Institut für Arbeitsmarkt-und Berufsforschung.

Jiang, H., & Sohail, F. (2019). *Skill-Biased Entrepreneurial Decline*. https://doi.org/10.2139/ssrn.3480303

Jones, C. I. (2016). The Facts of Economic Growth. In Handbook of Macroeconomics (vol. 2, pp. 3–69). Elsevier. https://doi.org/10.1016/bs.hesmac.2016.03.002

Jordà, Ò., Schularick, M., & Taylor, A. M. (2016). Sovereigns Versus Banks: Credit, Crises, and Consequences. *Journal of the European Economic Association, 14*(1), 45–79. https://doi.org/10.1111/jeea.12144

Kalemli-Ozcan, S., Laeven, L., & Moreno, D. (2019). *Debt overhang, rollover risk, and corporate investment: evidence from the European crisis* (Nr. 2241; Working Paper Series). European Central Bank.

Kawaguchi, D., & Miyazaki, J. (2009). Working mothers and sons' preferences regarding female labor supply: direct evidence from stated preferences. *Journal of Population Economics, 22*(1), 115–130. https://doi.org/10.1007/s00148-007-0175-2

Kleven, H., Landais, C., & Søgaard, J. E. (2019). Children and Gender Inequality: Evidence from Denmark. American Economic Journal: *Applied Economics, 11*(4), 181–209. https://doi.org/10.1257/app.20180010

Knoll, B., Riedel, N., Schwab, T., Todtenhaupt, M., & Voget, J. (2019). Cross-Border Effects of R&D Tax Incentives. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3484384

Koch, R., & Langenmayr, D. (2020). Der steuerliche Umgang mit Verlusten: Reformoptionen für die Corona-Krise. *Wirtschaftsdienst, 2020*(5), 367–373.

Kohlrausch, B., Zucco, A., & Hövermann, A. (2020). *Die Einkommensungleichheit wird durch die Corona-Krise noch weiter verstärkt* (Nr. 62; WSI Report, p. 25). Hans-Böckler-Stiftung, Wirtschafts- und Sozialwissenschaftliches Institut (WSI).

Kortum, S., & Lerner, J. (2000). Assessing the Contribution of Venture Capital to Innovation. *RAND Journal of Economics, 31*(4), 674–692.

Kozeniauskas, N. (2017). What's Driving the Decline in Entrepreneurship? https://www.semanticscholar.org/paper/What-%E2%80%99s-Driving-the-Decline-in-Entrepreneurship-%E2%88%97-Kozeniauskas/e466eadfd37790935fd1f95ab478a3f09d1e815c

Kremer, M. R. (1998). Patent Buyouts: A Mechanism for Encouraging Innovation. *Quarterly Journal of Economics -Cambridge Massachusetts-*. https://doi.org/10.1162/003355398555865

Kuhl, M. (2010). *Wem werden Konjunkturprogramme gerecht? Eine budgetorientierte Gender-Analyse der Konjunkturpakete I und II*. Friedrich-Ebert-Stiftung, Abt. Wirtschafts- und Sozialpolitik.

Lorenz, N., Ihle, P., & Breyer, F. (2020). *Aging and Health Care Expenditures: A Non-Parametric Approach* (SSRN Scholarly Paper ID 3576293). Social Science Research Network. https://papers.ssrn.com/abstract=3576293

Lucking, B., Bloom, N., & van Reenen, J. (2018). *Have R&D Spillovers Changed?* (NBER Working Paper Nr. 24622). National Bureau of Economic Research, Inc.

Maffini, G., Xing, J., & Devereux, M. P. (2019). The Impact of Investment Incentives: Evidence from UK Corporation Tax Returns. *American Economic Journal: Economic Policy, 11*(3), 361–389. https://doi.org/10.1257/pol.20170254

Maldonado, J., & De Witte, K. (2020). The effect of school closures on standardised student test. *FEB Research Report Department of Economics*. https://lirias.kuleuven.be/3189074

Mazzucato, M. (2015). *The Entrepreneurial State: Debunking Public vs. Private Sector Myths* (2nd Edition). PublicAffairs.

Mazzucato, M. (2018a). *Mission-oriented research & innovation in the European Union: a problem-solving approach to fuel innovation-led growth*. Publications Office of the European Union.

Mazzucato, M. (2018b). Mission-oriented innovation policies: challenges and opportunities. *Industrial and Corporate Change, 27*(5), 803–815. https://doi.org/10.1093/icc/dty034

McAdam, P., & Willman, A. (2018). Unraveling the skill premium. *Macroeconomic Dynamics, 22*(1), 33–62. https://doi.org/10.1017/S1365100516000547

Melitz, M. (2005). When and How Should Infant Industries Be Protected? *Journal of International Economics, 66,* 177–196.

Nationale Akademie der Wissenschaften Leopoldina. (2019). *Klimaziele 2030 Wege zu einer nachhaltigen Reduktion der CO2-Emissionen*. https://www.leopoldina.org/uploads/tx_leopublication/2019_Stellungnahme_Klimaziele_2030_Final.pdf

Nationale Akademie der Wissenschaften Leopoldina. (2020a). Coronavirus-Pandemie: Medizinische Versorgung und patientennahe Forschung in einem adaptiven Gesundheitssystem (4. Ad-hoc-Stellungnahme). https://www.leopoldina.org/uploads/tx_leopublication/2020_05_27_Stellungnahme_Corona_Gesundheitssystem.pdf

Nationale Akademie der Wissenschaften Leopoldina. (2020b). Coronavirus-Pandemie: Für ein krisenresistentes Bildungssystem (5. Ad-hoc-Stellungnahme). https://www.leopoldina.org/uploads/tx_leopublication/2020_08_05_Leopoldina_Stellungnahme_Coronavirus_Bildung.pdf

Nationale Akademie der Wissenschaften Leopoldina. (2021). *Kinder und Jugendliche in der Coronavirus-Pandemie – Psychosoziale und edukative Herausforderungen und Chancen* (8. Ad-hoc-Stellungnahme). https://www.leopoldina.org/uploads/tx_leopublication/2021_Corona_Kinder_und_Jugendliche.pdf

Nationale Akademie der Wissenschaften Leopoldina, Deutsche Akademie der Technikwissenschaften, & Union der deutschen Akademien der Wissenschaften. (2015). *Public Health in Deutschland: Strukturen, Entwicklungen und globale Herausforderungen.* Leopoldina.

Nationale Akademie der Wissenschaften Leopoldina, Deutsche Akademie der Technikwissenschaften, & Union der deutschen Akademien der Wissenschaften. (2020). *Energiewende 2030: Europas Weg zur Klimaneutralität* [Ad-hoc Stellungnahme]. https://www.leopoldina.org/uploads/tx_leopublication/2020_Energiewende_2030_Final.pdf

Nationaler Normenkontrollrat. (2017). *Anmerkungen zur Rechts- und Verwaltungsvereinfachung: Schlussfolgerungen aus der Flüchtlingskrise für die Handlungs- und Zukunftsfähigkeit von Staat und Verwaltung*. https://www.normenkontrollrat.bund.de/resource/blob/300864/846172/a3bbc8cc31c0b27c2ac4c4f2fd0c1bfb/2017-11-xx-download-nkr-schlussfolgerungen-fluechtlingskrise-2018-data.pdf?download=1

Nationaler Normenkontrollrat. (2020). *Krise als Weckruf: Verwaltung modernisieren, Digitalisierungsschub nutzen, Gesetze praxistauglich machen - Jahresbericht 2020* (p. 108). https://www.normenkontrollrat.bund.de/resource/blob/72494/1800428/44bc6f69bc0256967097282af768a05e/20201021-nkr-jahresbericht-2020-data.pdf

Oberfichtner, M. (2019). *Arbeitslosenversicherung für Existenzgründer Unterschiedliche Leistungen trotz gleicher Beiträge*. IAB-Kurzbericht.

OECD. (2010). *Tax Policy Reform and Economic Growth. OECD*. https://doi.org/10.1787/9789264091085-en

OECD. (2021). *The State of School Education: One Year into the COVID Pandemic.* https://doi.org/10.1787/201dde84-en

Oreopoulos, P., von Wachter, T., & Heisz, A. (2012). The Short- and Long-Term Career Effects of Graduating in a Recession. *American Economic Journal: Applied Economics, 4*(1), 1–29. https://doi.org/10.1257/app.4.1.1

Projektgruppe Gemeinschaftsdiagnose. (2020). *Erholung verliert an Fahrt: Wirtschaft und Politik weiter im Zeichen der Pandemie* (Nr. 2; Gemeinschaftsdiagnose). https://gemeinschaftsdiagnose.de/2020/10/14/erholung-verliert-an-fahrt-wirtschaft-und-politik-weiter-im-zeichen-der-pandemie/

Rachel, T. (2020). *Schriftliche Frage der Abgeordneten Katja Suding der Fraktion der FDP.* http://docs.dpaq.de/16744-sf_8_227_suding.pdf

Rainer, H., Bauernschuster, S., Danzer, N., Fichtl, A., Hener, T., Holzner, C., & Reinkowski, J. (2013). Kindergeld und Kinderfreibeträge in Deutschland: Evaluierung der Auswirkungen auf familienpolitische Ziele. *ifo Schnelldienst, 66*(09), 28–36.

Real-Time Population Survey. (2021). https://sites.google.com/view/covid-rps/home

Riess, A., & Välilä, T. (2006). Industrial policy: a tale of innovators, champions, and B52s. *EIB Papers, 11*(1), 10–34.

Rodrik, D. (2004). *Industrial Policy for the Twenty-First Century* (SSRN Scholarly Paper ID 617544). Social Science Research Network. https://papers.ssrn.com/abstract=617544

Rodrik, D. (2008). *Normalizing Industrial Policy* (Nr. 3; Commission on Growth and Development Working Paper). https://drodrik.scholar.harvard.edu/files/dani-rodrik/files/normalizing-industrial-policy.pdf

Ruhose, J., Thomsen, S. L., & Weilage, I. (2019). The benefits of adult learning: Work-related training, social capital, and earnings. *Economics of Education Review, 72,* 166–186. https://doi.org/10.1016/j.econedurev.2019.05.010

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2007). *Staatsverschuldung wirksam begrenzen: Expertise im Auftrag des Bundesministers für Wirtschaft und Technologie.*

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2015). Öffentliche Finanzen: Fehlende Neutralität im Steuersystem hemmt Investitionen und Wachstum. In Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (eds.), *Zukunftsfähigkeit in den Mittelpunkt – Jahresgutachten 15/16*. Statistisches Bundesamt. https://www.sachverstaendigenrat-wirtschaft.de/publikationen/jahresgutachten/fruehere-jahresgutachten/jahresgutachten-201516.html

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2018). Vor wichtigen wirtschaftspolitischen Weichenstellungen [Jahresgutachten 18/19]. Statistisches Bundesamt. https://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/gutachten/jg201819/JG2018-19_gesamt.pdf

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2019a). Aufbruch zu einer neuen Klimapolitik [Sondergutachten]. Statistisches Bundesamt. https://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/gutachten/sg2019/sg_2019.pdf

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2019b). Den Strukturwandel meistern [Jahresgutachten 19/20]. https://www.sachverstaendigenrat-wirtschaft.de/jahresgutachten-2019.html

Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung. (2020). *Corona-Krise gemeinsam bewältigen, Resilienz und Wachstum stärken: Jahresgutachten 20/21* [Jahresgutachten].

Salgado, S. (2019). *Technical Change and Entrepreneurship* (Nr. 634; 2019 Meeting Papers). Society for Economic Dynamics. https://ideas.repec.org/p/red/sed019634.html

Schmieder, J., & Wrohlich, K. (2020). *Gleichstellungspolitische Antworten auf die Arbeitsmarktwirkungen der COVID-19-Pandemie: Policy Paper im Auftrag des Bundesministeriums für Familie, Senioren, Frauen und Jugend (BMFSFJ)* (vol. 154). DIW Berlin, German Institute for Economic Research.

Schnellenbach, J. (2021). Die Schuldenbremse bleibt sinnvoll. *ifo Schnelldienst, 74*(4), 11–13.

Schoukens, P., & Weber, E. (2020). *Unemployment insurance for the self-employed: A way forward post-corona.* https://research.tilburguniversity.edu/en/publications/unemployment-insurance-for-the-self-employed-a-way-forward-post-c

Schuknecht, L. (2021). Finanzpolitik braucht einen ordnungspolitischen Anker in guten und in schlechten Zeiten. *ifo Schnelldienst, 74*(4), 3–7.

Schuknecht, L., Schaltegger, C. A., Salvi, M., Schnellenbach, J., Lenk, T., Bender, C., Hesse, M., Wagner, G. G., Korioth, S., Gründler, K., Heil, P., Potrafke, N., & Niepelt, D. (2021). Zankapfel Schuldenbremse: Bewährtes Instrument auch in Krisenzeiten? *ifo Schnelldienst, 74*(4), 3–30.

Schwerdt, G., Messer, D., Wößmann, L., & Wolter, S. C. (2012). The impact of an adult education voucher program: Evidence from a randomized field experiment. *Journal of Public Economics, 96*(7–8), 569–583.

Ständige wissenschaftliche Kommission der KMK (StäwiKo). (2021). *Pandemiebedingte Lernrückstände aufholen – Unterstützungsmaßnahmen fokussieren, verknüpfen und evaluieren.*

Stantcheva, S. (2021). Inequalities in the Times of a Pandemic. *Economic Policy.* https://www.economic-policy.org/wp-content/uploads/2021/04/9103_Inequalities-in-the-Times-of-a-Pandemic.pdf

Stiglitz, J. E., Lin, J. Y., & Monga, C. (2013). *The rejuvenation of industrial policy* (Nr. 6628; Policy Research Working Paper). World Bank. https://openknowledge.worldbank.org/handle/10986/16845

Streibich, K.-H., & Lenarz, T. (2021). *Resilienz und Leistungsfähigkeit des Gesundheitswesens in Krisenzeiten* (acatech IMPULS).

Tamm, M. (2019). Fathers' parental leave-taking, childcare involvement and labor market participation. *Labour Economics, 59*, 184–197. https://doi.org/10.1016/j.labeco.2019.04.007

Tazhitdinova, A. (2020). Do only tax incentives matter? Labor supply and demand responses to an unusually large and salient tax break. *Journal of Public Economics, 184*(C). https://ideas.repec.org/a/eee/pubeco/v184y2020ics0047272720300268.html

Weber, E. (20 November 2020). Jobs retten oder Stillstand finanzieren? Nur mit Qualifizierung dürfte sich Kurzarbeit für den Fiskus auf Dauer auszahlen. IAB Forum. https://www.iab-forum.de/jobs-retten-oder-still-stand-finanzieren-nur-mit-qualifizierung-duerfte-sich-kurzarbeit-fuer-den-fiskus-auf-dauer-auszahlen/

Werding, M. (2020). *Rentenfinanzen und fiskalische Tragfähigkeit: Aktueller Rechtsstand und Effekte verschiedener Reformen* (Working Paper 06/2020). Arbeitspapier. https://www.econstor.eu/handle/10419/226020

Wiesner, C. (2021). Das Konjunkturpaket der Bundesregierung und seine Auswirkungen auf Frauen und Männer. *Wirtschaftsdienst, 2021*(5), 21–24.

Wissenschaftlicher Beirat beim Bundesministerium der Finanzen. (2018). *Zur Reform der Besteuerung von Ehegatten - Gutachten des Wissenschaftlichen Beirats beim Bundesministerium der Finanzen.* https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Ministerium/Geschaeftsbereich/Wissenschaftlicher_Beirat/Gutachten_und_Stellungnahmen/Ausgewaehlte_Texte/2018-09-27-Gutachten-Besteuerung-von-Ehegatten-anlage.pdf?__blob=publicationFile&v=2

Wissenschaftlicher Beirat beim Bundesministerium der Finanzen. (2019). *US-Steuerreform 2018 – Steuerpolitische Folgerungen für Deutschland* [Stellungnahme]. https://www.bundesfinanzministerium.de/Content/DE/Downloads/Ministerium/Wissenschaftlicher-Beirat/Gutachten/2019-03-15-WB-US-Steuerreform-2018.pdf?__blob=publicationFile&v=8

Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie. (2016). *Mehr Transparenz in der Bildungspolitik* (p. 32) [Gutachten]. https://www.bmwi.de/Redaktion/DE/Publikationen/Ministerium/Veroeffentlichung-Wissenschaftlicher-Beirat/wissenschaftlicher-beirat-mehr-transparenz-in-der-bildungspolitik.pdf?__blob=publicationFile&v=7

Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie. (2020). *Öffentliche Infrastruktur in Deutschland: Probleme und Reformbedarf* (p. 28) https://www.bmwi.de/Redaktion/DE/Publikationen/Ministerium/Veroeffentlichung-Wissenschaftlicher-Beirat/gutachten-oeffentliche-infrastruktur-in-deutschland.pdf?__blob=publicationFile&v=12

Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie. (2021a). *Digitalisierung in Deutschland – Lehren aus der Corona-Krise* (p. 46) [Gutachten]. https://www.bmwi.de/Redaktion/DE/Publikationen/Ministerium/Veroeffentlichung-Wissenschaftlicher-Beirat/gutachten-digitalisierung-in-deutschland.pdf?__blob=publicationFile&v=4

Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft und Energie. (2021b). *Vorschläge für eine Reform der gesetzlichen Rentenversicherung* (p. 76) [Gutachten]. https://www.bmwi.de/Redaktion/DE/Publikationen/Ministerium/Veroeffentlichung-Wissenschaftlicher-Beirat/wissenschaftlicher-beirat-vorschlaege-reform-gutachten.pdf?__blob=publicationFile&v=14

Woodford, M. (2011). Simple Analytics of the Government Expenditure Multiplier. *American Economic Journal: Macroeconomics, 3*(1), 1–35. https://doi.org/10.1257/mac.3.1.1

Wößmann, L. (2020). Folgekosten ausbleibenden Lernens: Was wir über die Corona-bedingten Schulschließungen aus der Forschung lernen können. *Ifo Schnelldienst, 73*(06), 38–44.

Wößmann, L., Freundl, V., Grewenig, E., Lergetporer, P., Werner, K., & Zierow, L. (2020). Bildung in der Coronakrise: Wie haben die Schulkinder die Zeit der Schulschließungen verbracht, und welche Bildungsmaßnahmen befürworten die Deutschen? *ifo Schnelldienst, 73*(09), 25–39.

Wößmann, L., Freundl, V., Grewenig, E., Lergetporer, P., Werner, K., & Zierow, L. (2021). Bildung erneut im Lockdown: Wie verbrachten Schulkinder die Schulschließungen Anfang 2021? *ifo Schnelldienst, 74*(05).

Wübbeke, J., Meissner, M., Zenglein, M. J., Ives, J., & Conrad, B. (2016). *Made in China 2025: The making of a high-tech superpower and consequences for industrial countries* (Nr. 2; Merics Papers on China). Mercator Institute for China Studies. https://merics.org/sites/default/files/2020-04/Made%20in%20China%202025.pdf

Zinn, S., Kreyenfeld, M., & Bayer, M. (2020). *Kinderbetreuung in Corona-Zeiten: Mütter tragen die Hauptlast, aber Väter holen auf* (Nr. 51; DIW Aktuell). DIW Berlin, German Institute for Economic Research. https://ideas.repec.org/p/diw/diwakt/51de.html

Zwick, E., & Mahon, J. (2017). Tax Policy and Heterogeneous Investment Behavior. *American Economic Review, 107*(1), 217–248. https://doi.org/10.1257/aer.20140855

7 Appendix

7.1 Derivation of table in chapter 5

It is assumed that another large crisis that could cause such a sharp rise in debt ratio will not come about over the course of the next decades. The calculation is as follows:

$$q_{t+1} = (q_t - p) \times f$$

here q_t t represents the government debt ratio at the beginning of the year, p which (presumed to remain constant) shows the primary budget surplus relative to GDP and $f = \frac{1+r}{1+g}$ the (again presumed to remain constant) growth factors for government debt ratio, which results from the actual GDP growth and the real interest rate. The iteration of the equation of motion over 30 years is:

$$q_{t+30} = q_t f^{30} - p \sum_{h=1}^{30} f^h$$

The sum can be simplified as a finite geometric series for $f \neq 1$:

$$p \sum_{h=1}^{30} f^h = p\left(\sum_{h=0}^{30} f^h - 1\right) = p\left(\frac{1 - f^{31}}{1 - f} - 1\right)$$

7.2 Drafting process of the statement

In September 2020, the Presidium of the National Academy of Sciences Leopoldina decided to appoint a working group responsible for researching the consequences of the COVID-19 pandemic on structural change and on economic policy. This was done in the context of European and global interdependencies to draw up possible courses of action for policy makers by Summer 2021. The working group commenced its efforts in Autumn 2020 and developed the present statement in six sessions. The Presidium of the Leopoldina approved the statement on 13 July 2021.

7.3 Contributors

Members of the working group

Prof. Dr. Dietmar Harhoff	Max Planck Institute for Innovation and Competition, Munich
Prof. Dr. Eckhard Janeba	Professor of Public Finance and Economic Policy, University of Mannheim
Prof. Dr. Dorothea Kübler	Department of Market Behavior at WZB Berlin Social Science Centre, TU Berlin
Prof. Dr. Nadine Riedel	Institute for Public and Regional Economics, University of Münster
Prof. Regina T. Riphahn, Ph.D.	Vice President of the Leopoldina, Chair for Statistics and Empirical Economics at Friedrich-Alexander-University Erlangen-Nürnberg, Speaker of the working group
Prof. Dr. Dr. h.c. Christoph M. Schmidt	President of RWI – Leibniz Institute for Economic Research, Essen, Speaker of the working group
Prof. Dr. Moritz Schularick	Institute for Macroeconomics and Econometrics, University of Bonn
Prof. Dr. Dr. h.c. Gert G. Wagner	German Institute for Economic Research (DIW Berlin) and Max Planck Institute for Human Development, Berlin
Prof. Nicola Fuchs-Schündeln, Ph.D.	Chair of Macroeconomics and Development, Goethe University Frankfurt
Prof. Dr. Ludger Wößmann	Ludwig Maximilian University and ifo Center for the Economics of Education, Munich

In advisory function:

Prof. Dr. Claudia M. Buch

The working group would like to thank Prof. Dr. Martin Hellwig, Max Planck Institute for Research on Collective Goods, for his important input in the early stages of the working group.

Reviewers

The statement was reviewed by the following independent scientists. The reviewers were selected by the Presidium of the Leopoldina and the President of the Leopoldina.

Prof. Dr. Nathalie Behnke	Technical University of Darmstadt, Institute of Political Science, Working Group 'Public Administration, Public Policy'
Prof. Dr. Markus Brunnermeier	Princeton University, Bendheim Center for Finance
Prof. Dr. Georg Cremer	University of Freiburg, Honorary Professor for Economics, former Secretary-General of the German Caritas Association.
Prof. Dr. Christoph Engel	Max Planck Institute for Research on Collective Goods
Prof. Dr. Thomas König	University of Mannheim, Professorship of Political Science, European Politics
Prof. Dr. Uta Schönberg	University College London, Professor of Economics
Dr. Ludger Schuknecht	Visiting Professor, Lee Kuan Yew School of Public Policy and former Deputy Secretary-General of the OECD
Prof. Dr. Jens Südekum	Heinrich Heine University Düsseldorf, Düsseldorf Institute for Competition Economics (DICE)
Prof. Dr. Christian Waldhoff	Humboldt-Universität zu Berlin, Chair of Public Law and Law of Public Finance

Scientific Officers in the working group

Dr. Kathrin Happe	Department Science – Policy – Society, Leopoldina
Johannes Mengel	Department Science – Policy – Society, Leopoldina

Selected Statements

2021

Children and adolescents in the COVID-19 pandemic:
Psychosocial and educational challenges and opportunities*

Digitalisation and democracy

Neubewertung des Schutzes von In-vitro-Embryonen in Deutschland
(English translation coming)

Resilienz digitalisierter Energiesysteme | DE

Maintaining open access to Digital Sequence Information*

2020

Coronavirus pandemic: Use the end of year holidays to impose a strict lockdown*

Coronavirus pandemic: Establishing effective rules for autumn and winter*

Coronavirus Pandemic: Towards a Crisis-Resistant Education System*

Coronavirus Pandemic: Medical Care and Patient-Oriented Research in an Adaptive Healthcare System*

Coronavirus Pandemic– Sustainable Ways to Overcome the Crisis *

Coronavirus Pandemic– Measures Relevant to Health*

Coronavirus Pandemic: Challenges and options for intervention*

Biodiversity and Management of Agricultural Landscapes

Additive Fertigung – Entwicklungen, Möglichkeiten und Herausforderungen | DE

Zentrale und dezentrale Elemente im Energiesystem | DE

2019

Towards a scientifically justified, differentiated regulation of genome edited plants in the EU

Über eine CO_2-Bepreisung zur Sektorenkopplung: Ein neues Marktdesign für die Energiewende | DE

Climate targets 2030: Towards a sustainable reduction of CO_2 emissions*

Air pollution and health*

Reproductive medicine in Germany – towards an updated legal framework

Clean air – Nitrogen oxides and particulate matter in ambient air: Basic principles and recommendations

*Ad hoc statement

DE – available only in German

All publications are available for free in PDF format at:
https://www.leopoldina.org/en/publications

Deutsche Akademie der Naturforscher Leopoldina e. V.
– National Academy of Sciences –

Jägerberg 1
06108 Halle (Saale)
Phone: 0049 345 472 39-867
Fax: 0049 345 472 39-839
Email: politikberatung@leopoldina.org

Berlin offices:
Reinhardtstraße 14
10117 Berlin

Unter den Linden 4
10117 Berlin

The Leopoldina originated in 1652 as a classical scholarly society and now has 1,600 members from almost all branches of science. In 2008, the Leopoldina was appointed as the German National Academy of Sciences and, in this capacity, was invested with two major objectives: representing the German scientific community internationally, and providing policymakers and the public with science-based advice.

The Leopoldina champions the freedom and appreciation of science. It promotes a scientifically enlightened society and the responsible application of scientific insight for the benefit of humankind and the natural world. In its interdisciplinary discourse, the Academy transcends thematic, political and cultural boundaries. It is also an advocate of human rights.

It is the role of the Leopoldina, in co-operation with other national and international organisations, to identify and analyse scientific issues of social importance. The Leopoldina presents its policy recommendations in a scientifically qualified, independent, transparent and prospective manner, ever mindful of the standards and consequences of science.

DOI: https://doi.org/10.26164/leopoldina_03_00414

www.leopoldina.org/en