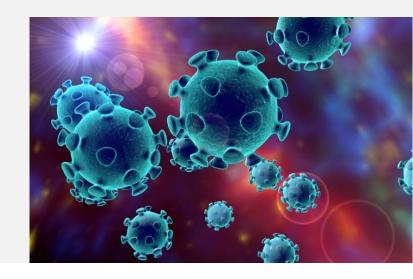
Creditreform C Rating

Structural Pandemic Vulnerability in Europe in Light of Covid-19

Economic Research June 2020



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Creditreform Rating AG

Hellersbergstrasse 11 D - 41460 Neuss

Phone: +49 (0) 2131 / 109-626

Fax: +49 (0) 2131 / 109-627

E-Mail: info@creditreform-rating.de Internet: www.creditreform-rating.de

CEO: Dr. Michael Munsch Chairman of the Board: Prof. Dr. Helmut Rödl HRB 10522, Amtsgericht Neuss



Covid-19: The most severe health crisis since the Spanish flu

Covid-19 is still the overriding subject and keeps not only politicians, epidemiologists and virologists, but also the economy and society as a whole on their toes. According to many experts, the Covid-19 pandemic is not only the most severe health crisis since the Spanish flu in 1918, but also one of the most economically costly pandemics in recent history.

Most forecasts indicate that the crisis caused by the novel coronavirus has become by far the greatest challenge for the global economy since the Second World War. In its World Economic Outlook presented at its spring meeting, the International Monetary Fund (IMF) predicted that real global economic growth would shrink by 3% this year, with advanced economies likely to be disproportionately affected by the corona crisis.¹

While there is certainly some experience with pandemic-related events, particularly with regard to the transmission channels through which pandemics affect the economy and society, this crisis is very different from previous events.² On the one hand, we are living in a state of unusually prolonged uncertainty, similar to periods of armed conflict or political crisis.

Global economy plunges on the back of synchronized shutdown

The distinct difference, however, is arguably to be seen in the fact that, in contrast to other crises, the state did not support or stimulate economic activity and social life in the first instance. On the contrary, it was the mitigation of the spread of the virus through massive containment

measures that eventually prompted the current economic crisis. To be sure, the measures seized have been vital in slowing down the spread of Covid-19 and preventing the national health systems from collapsing, even with the benefit of hindsight. Nevertheless, the imperative and sometimes drastic measures have led to a synchronized lockdown in most developed economies as well as in a large number of emerging and developing countries, resulting in an unprecedented paralysis of economic activity.

In many cases, not only were travel restrictions, distancing and hygiene rules ('social distancing') implemented, but schools, childcare facilities, bars, restaurants, sports centers, and non-essential shops were closed and mass gatherings prohibited. In many countries, national borders have been closed or tightened border controls have been introduced.

Against this background, the pandemic is limiting foreign demand, but also demand for imported goods and services. Production is adversely affected by direct disruptions in supply, and indirectly through global value chains via Asia and a number of major industrialized countries. In addition, the above-mentioned measures have a negative impact on domestic demand, which is curbed by postponed corporate investment decisions and consumer spending restraint. The closure of construction sites and production facilities has led to a deterioration in labor market conditions, and the corporate sector is confronted with unparalleled liquidity problems.

Meanwhile, European countries are gradually removing the obstacles put in place to prevent the spread of coronavirus. We believe that the ubig-

¹ IMF (2020): The Great Lockdown, in: World Economic Outlook April 2020, Washington D.C.

² See Boissay, F. und P. Rungcharoenkitkul (2020): Macroeconomic effects of Covid-19: an early review, BIS Bulletin No. 7.



uitous Covid-19 risks and corresponding distancing and hygiene rules will continue to accompany us throughout the year, and that economic activity is likely to remain hampered in the near term. The Government Response Stringency Index of the Blavatnik School of Government at Oxford University, for instance, indicates that the confinement measures in Europe, but also worldwide, are only being reversed very cautiously (see Figure 1). Moreover, as the situation in China shows, one should be prepared that restrictions may be intensified again going forward.

Whilst dynamics of Covid-19 appear to be decreasing in Europe, coronavirus infections remain on an upward trajectory in other parts of the world; and even though such comparisons may be distorted due to discrepancies in data collection and differing testing activities, in some regions, such as Africa or Latin America, Covid-19 only started to gain momentum in May (see Figure 2).

Forecasts subject to extreme uncertainty

Although there are early indications that we will witness an unprecedented decline in economic activity in the first half of the year, all assumptions regarding the corona pandemic and its economic, social, and health consequences are subject to extreme uncertainty. Progress towards normalization will not least depend on how quickly effective drugs and/or vaccines can be developed. In addition, it may become necessary to tighten or resume containment measures going forward.

The outbreak of Covid-19 had a significant impact on economic performance in the euro area in the first quarter of 2020. Real GDP fell by 3.2% compared with the first quarter of the previous year: in Spain and France the economy contracted by 4.1 and 5.0% y-o-y respectively, while the Italian economy slumped by 5.4% (see Figure 3). Considering that in most member states the shutdown

had only been in force since mid-March, Q1 data provides a glimpse of how dramatic the decline in the second guarter will likely be.

At this stage, we expect the impact to be very pronounced, but short-lived, in all regions of the developed world. The pandemic should gradually abate in the second half of this year, so that economic disturbances will be concentrated mainly in the second quarter. In the coming year, GDP growth will probably pick up again – depending on the economy to a greater or lesser extent.

Thus far, however, there is hardly any clear evidence as to the extent to which the various European economies will be affected by Covid-19. While there are scenario analyses and estimates of the real economic impact, based on assumptions about how Covid-19 and the containment and support measures will affect the individual economic sectors, we lack timely data for the second quarter. Eurostat will not present a first flash estimate for the economic development in the euro area for Q2 until 14 August this year.

A multi-dimensional assessment of vulnerability to Covid-19

In order to assess the potential impact of Covid-19 on the EU member states and on the United Kingdom (UK), Creditreform Rating has created the **Pandemic Vulnerability Index**, or **PVI** for short. The PVI is a measure that aims to capture the degree to which the different economies in Europe are vulnerable to pandemics such as Covid-19. The PVI provides a rough indication of the potential economic, health, and social consequences of a pandemic outbreak by identifying different risk dimensions and country-specific exposures.

By definition, the PVI is a ratio that can be used for an intra-European peer comparison (EU-27 and UK). Hence, the index is a relative measure, rather than a measure providing absolute

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amounts in terms of loss of gross value added, the extent of rampant unemployment, or the number of deaths due to Covid-19 infections.

The PVI is composed of a total of five pillars, which in turn consist of several proxy variables (see Figure 4):

- Economic structure
- Labor market
- Healthcare system
- Population
- Mobile work capacity

The worrying events surrounding Covid-19 are certainly a specific and, for most people, immediately tangible case of application for the PVI. However, we would like to emphasize that with PVI we have established a measure that allows us to assess not only the relative vulnerability of an economy and society to Covid-19, but first and foremost the structural susceptibility to pandemics in general.

Standardizing the determinants of the Pandemic Vulnerability Index

The PVI covers many facets of structural vulnerability to pandemics and does not focus solely on economic vulnerability or the health system. While this obviously places greater demands on the PVI user, since underlying drivers must always be taken into account when examining the respective results, this is one of the great strengths of the PVI: not only does it enable an assessment of the real economic impact by visualizing the vulnerability of the economic model or labor market, but it also allows evaluation of health and social aspects. The component capacities for mobile work even provides for insights into progress in terms of an economy's entry into the digital age.

The PVI is the sum of the building blocks economic structure, labor market, health system, population and mobile work capacity, with the five components being equally weighted. The PVI ranges from -0.65 to +0.65. Higher values of the PVI suggest a comparatively higher vulnerability to Covid-19 and pandemics in general. The same applies to the results of the cornerstones of the PVI: higher, i.e. more positive, values display an economy's higher susceptibility to a pandemic in the respective dimension.

The indicator variables of the five PVI pillars were standardized using the Z-score, so that the respective values of the proxy variables have a mean of zero and a standard deviation of one ('Z-transformation'). The index values of the subcomponents do not lie within a homogeneous index range as these result from the relative distribution of the observed values of the constituent indicators within the EU-27 and UK. The overview in Figure 5 shows the proxy variables that make up the five PVI components.

European economies on the periphery tend to be more vulnerable to pandemics

The PVI shows that the economies on the European periphery tend to be more vulnerable to pandemics (see Figure 6). Taking all indicator variables into account, it is above all Italy, Croatia, Malta, and Greece that display high PVI values and thus appear more susceptible to pandemics such as Covid-19 than other European states. Overall, Italy seems to be the country most susceptible to pandemics. A PVI of 0.65 corresponds the top position in the risk ranking. The southern European economies of Malta and Croatia have a PVI of 0.50 and 0.49, respectively, also suggesting an elevated pandemic risk, closely followed by Greece at 0.43.

Although this result fits in well with the narrative of recent months during which Italy attracted considerable media attention associated with

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Covid-19, we would like to emphasize once more that the PVI applies to pandemics in general and not exclusively to the coronavirus. Put differently, the PVI ranking is able to deliver plausible results in light of current events, but it does not necessarily correlate with Covid-19 infection rates.

Italy's poor performance is not the result of a high risk score in a single category. While its economic structure exerts a neutral influence with respect to Covid-19, adverse aspects with regard to population characteristics (e.g. relatively high proportion of elderly people), increased risks in the health care system (especially a low number of acute care beds) and weak mobile work capacities all contribute to this result. The structurally weak labor market weighs particularly heavily. A comparable picture emerges in Croatia and Greece, although Greece's PVI is not dragged down by the health care system component. Malta's third place in the risk ranking is mainly due to the risk factor population, which is caused by the extremely high population density; Malta's economic structure (i.e. high importance of tourism) and relatively poor mobile work capacity also weigh on the country's PVI.

Some CEECs are subject to high risk, while 'core' countries and northern seem better protected

It is worth mentioning that some Central and Eastern European countries (CEEC) rank relatively high. Values between 0.15 and 0.20 in the case of Slovakia, the Czech Republic and Hungary indicate comparatively high risks with regard to pandemics. With a PVI of 0.29, Poland even reaches a higher value than the peripheral country Portugal (0.21). Their relatively greater vulnerability towards Covid-19 and a pandemic more generally is largely driven by the weak performance of factors that favor mobile working, i.e. the low prevalence of home-based work and formal childcare, as well as pent-up demand for IT infrastructure and digital skills among the popu-

lation. At the same time, the increased vulnerability is closely linked to the economic structure of the CEECs, which is characterized by a strong integration into global value chains as well as a pivotal role of the industrial sector and a high proportion of micro-enterprises.

By contrast, the pandemic risks in core euro area countries such as Germany and Austria are comparatively low with a PVI of -0.57 and -0.31 respectively. Northern European economies such as Denmark and Sweden (-0.57 and -0.31) also display low vulnerability to pandemics. In terms of PVI, the Grand Duchy of Luxembourg has the lowest pandemic risk (PVI: -0.65). These countries share pronounced mobile work capacities and a high-quality healthcare system. In addition, they display favorable labor market conditions with very low levels of precarious employment and self-employment.

Economic structure: CEECs with relatively high risk exposure

CEECs generally appear to perform relatively poorly as regards the risk factor economic structure, owing to the fact that the upper third of the economic structure ranking comprises many economies from Central and Eastern Europe (see Figure 7). While countries such as Greece, Croatia and Malta display elevated risks due to the central importance of tourism and the fact that their company structures are dominated by small enterprises, the main reason for higher vulnerability to pandemic shocks in Central and Eastern Europe is these countries' strong integration in global manufacturing value chains. Ireland, which boasts the most open economy in Europe after Luxembourg (measured by international trade to GDP) and features one of the highest degrees of global value chain integration, leads the risk ranking in terms of economic structure.



Labor market: structural problems in major euro area economies

While unemployment and employment growth are two of the key metrics usually considered in the context of evaluating labor market performance, here we focus on precarious employment and the prevalence of self-employment, since we believe that these are the population groups that will feel the economic fallout of a pandemic and a potential shutdown most directly. The associated risk of a declining household income seems to be highest in Greece and Italy (see Figure 8). The labor markets of these two economies not only exhibit generally unfavorable metrics, but also top the risk category with a view to the incidence of precarious employment and self-employment. It should be noted that three of the five major European economies - Italy, France, and Spain - are more vulnerable than other European countries, whereas Germany shows the lowest risk exposure in this respect.

Healthcare system: Large differences in the driving factors of the risk situation

Looking at the pandemic risks emanating from the health care system, the Baltic state Latvia is the most prone, followed by the Netherlands and the UK (see Figure 9). However, it should be noted that it is challenging to pinpoint a common determining factor which mirrors the increased health risks of the respective economies in the upper third. For the Eastern European countries Latvia and Slovakia, it boils down to the number of healthy life years and the availability of doctors and medically-trained personnel. The latter is primarily responsible for the poor performance of Cyprus. In the UK, Spain, and Italy, it is primarily the relatively low number of acute care beds that acts as a drag on the healthcare system. By contrast, influenza as a cause of death is relatively widespread among the population 65 years and over in the Netherlands and Finland as compared

with the rest of Europe, although we note that national differences in the assessment of the cause of death may bias the results.

Population: demographic factors drag on Italy's and Germany's performance

With 2.3 in the sub-component population, Malta ranks well above its European peers (see Figure 10). As explained above, this is almost exclusively due to the extremely high population density on the Mediterranean island. Looking at the field behind Malta, the Netherlands - in fourth place - also has a relatively high population density, coupled with a moderately high proportion of older citizens (>= 65 years). Coming in at second and third place are Italy and Germany, both of which are characterized by a rather imbalanced demographic structure, with a very high proportion of over 65-year-olds, and a relatively high population density (upper third in Europe).

Mobile work capacity: the Netherlands and Scandinavians are European frontrunners

Regarding work from home, the Netherlands is the European frontrunner, outpacing all other European economies when it comes to providing infrastructure for mobile working (see Figure 11). A high skills level, alongside the widespread availability and use of broadband internet, are trademarks of the Dutch economy. By the same token, the share of children under the age of three in formal childcare and the proportion of employees working from home are also very high, respectively. Northern countries such as Sweden, Denmark, and Finland also enjoy significant advantages over their European partners in these areas.

The situation is quite different in the CEECs. In particular, Bulgaria and Romania have substantial room to improve. We note that Italy occupies a poor sixth place in the mobile work capacity risk

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ranking, ahead of Central and Eastern European countries such as Hungary, Latvia, and Lithuania.

Soaring public debt as a result of the Covid-19 support measures

To limit the economic, financial, and social impact of Covid-19, governments worldwide have taken massive economic support measures. To safeguard jobs and avoid a wave of corporate insolvencies, authorities have implemented

- (1) direct fiscal policy impulses through additional expenditure (additional medical resources, subsidies for SMEs, public investment) and foregone revenue (including the cancellation of certain taxes);
- (2) deferrals of tax and social security contribution payments and easing of the conditions for the repayment of credits, and
- (3) initiation of massive guarantee programs.

The US Center for Strategic and International Studies estimates that the scope of the fiscal policy packages in the G20 countries amounts to around USD 6.3 trillion (as of 29 April). The Brussels-based think-tank Bruegel reckons that the direct fiscal policy impulse in Europe ranges from 0.4% of GDP (Hungary) to 10.1% of GDP (Germany), while the extent and composition of government measures certainly varies greatly from country to country (as of 25 May, see Figure 12).

In the wake of the corona crisis, gross debt should thus skyrocket to unprecedented levels, regardless of whether we consider advanced economies or emerging and developing countries. This view is supported by recent estimates of the IMF, which expects a marked increase in budget deficits and public debt ratios. For this

year, the Fund forecasts an increase in the global public debt ratio from 83.3 to 96.4% of GDP.³

Fiscal policy leeway smallest in structurally most vulnerable economies

Although the fiscal policy response to Covid-19 is obviously indispensable and may be deemed as largely appropriate, the respective starting point in many economies has been rather unfavorable, as a number of countries had already faced elevated or high levels of public debt. However, in view of the key priority to save lives and safeguard the viability of the health system, the question over available scope to counteract Covid-19 from a medium to long-term fiscal sustainability perspective is of secondary importance at the current juncture.

Nonetheless, Figure 13 illustrates that it is precisely the economies most vulnerable to pandemics that have only limited, if any, fiscal buffers. For our purposes, we define fiscal space as the ratio of tax revenues to general government gross debt. The red quadrant indicates the combination of a high level of pandemic vulnerability coupled with little to virtually non-existent fiscal headroom. In addition to Greece and Portugal, this quadrant includes the major euro area economies Italy, Spain, and France. By contrast, the situation is relatively benign in the case of Luxembourg, Denmark, and Sweden, but also in Germany and Austria, all of which are located in the green quadrant, i.e. are less vulnerable to pandemics, whilst commanding over relatively extensive fiscal space.

CONTACT

Dr. Benjamin Mohr, Chief Economist

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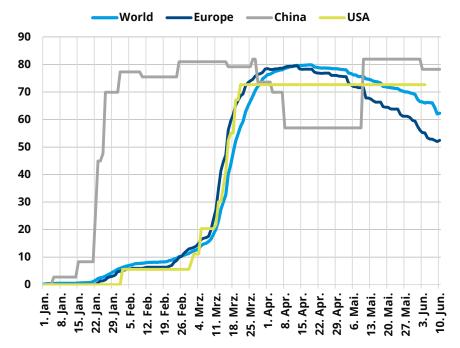
³ IMF (2020): Fiscal Policies to Support People During the Covid-19 Pandemic, in: Fiscal Monitor April 2020, Washington D.C.



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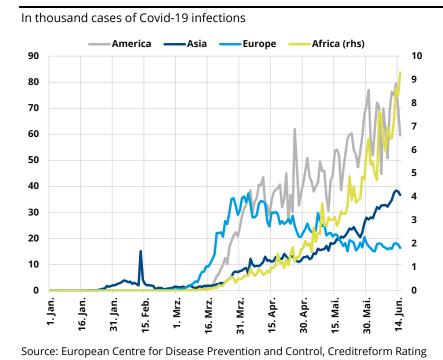
Figure I: The strictness of the state Covid-19 measures

Government Response Stringency Index (100 = strictest response), based on 9 response indicators, including e.g. school closures, workplace closures and travel bans, up to 10 June 2020, unweighted average of the individual states for World and Europe



Source: Blavatnik School of Government, Creditreform Rating

Figure 2: Number of Covid-19 infections





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Figure 3: Real GDP growth in European economies

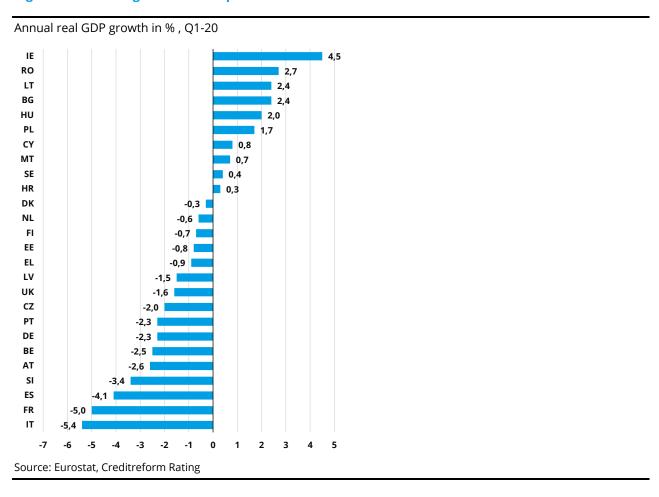


Figure 4: The five pillars of the Pandemic Vulnerability Index

Trade openness Tourism contribution to GDP Global value chain integration Industry share of total gross value added Share of micro-enterprises	ECONOMIC STRUCTURE			
Self-employment	LABOR MARKET			
Precarious employment				
Mortality rate influenza				
Acute care beds per head	HEALTH CARE			
Availability of health practioners	SYSTEM			
Healthy life years				
Population density	POPULATION			
Population share of elderly				
Work from home				
Formal childcare	re MOBILE WORK			
Broadband web access	CAPACITY			
Digital skills				
Source: Creditreform Rating				



Figure 5: Definitions and sources

Indicator name	Underlying data Source			
Trade openness	Exports and imports of goods and services, in % GDP, 2019	Eurostat		
Tourism contribution to GDP	Direct contribution reflects total spending within a particular country on travel and tourism by residents and non-residents for business and leisure purposes, as well as government spending on services directly linked to visitors; supplemented by indirect impact including, e.g. investment spending, government collective spending; in % of GDP, 2018	World Travel and Tourism Council		
lobal value chain integration	Domestic value added embodied in foreign final demand, in % of total value added, 2015	OECD		
ndustry share of total gross value added	Value added of manufacturing, in % of total gross value added, 2019	Eurostat		
hare of micro-enterprises	Number of enterprises with up to 9 persons employed, in % of enterprises in the total business economy (Sections B to N, S95, w/o financial and insurance activities)	Eurostat		
elf-employed	Self-employed persons (15-64 years), in % of total employment, 2019	Eurostat		
Precarious employment	Precarious employment (employees from 15 to 64 years with a short-term contract of up to 3 months), in % of total employment, 2019	Eurostat		
Mortality rate influenza among elderly	Cause of death influenza (incl. swine flu) among elderly (65 years and over), crude death rate per 100,000 inhabitants, unweighted mean 2000 to 2016	Eurostat		
cute care beds per head	Number of acute care hospital beds per 100,000 inhabitants, 2015 or latest available year	WHO, Eurostat		
vailability of health practioners	Composite index based onhe concentration of physicians, dentists, and nurses and midwives, amongst the adult population, 2018	WHO, Legatum		
Healthy life years	Healthy life years in absolute value at birth, 2018	Eurostat		
opulation density opulation share of elderly	Persons per square kilometre, 2018 Number of elderly (65 years and above), in % of total population, 2019	Eurostat Eurostat		
ork from home	Employed persons (from 20 to 64 years) working 'sometimes' or 'usually' from home, in % of total employment, 2019	Eurostat		
vailability of formal childcare	Children (less than 3 years) in formal childcare, zero hours (duration), in % over the population of each age group, 2018	Eurostat		
Broadband access	Households with broadband internet, in % of households, 2019	Eurostat		
Digital skills	Individuals who have basic or above basic overall digital skills, in % of all individuals, 2019	Eurostat		



Figure 6: Pandemic Vulnerability Index

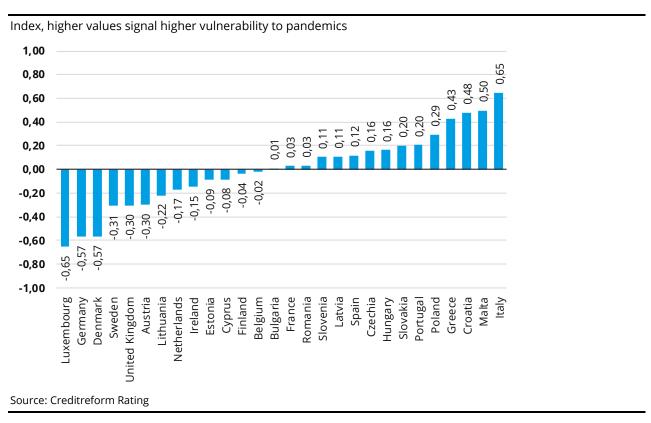
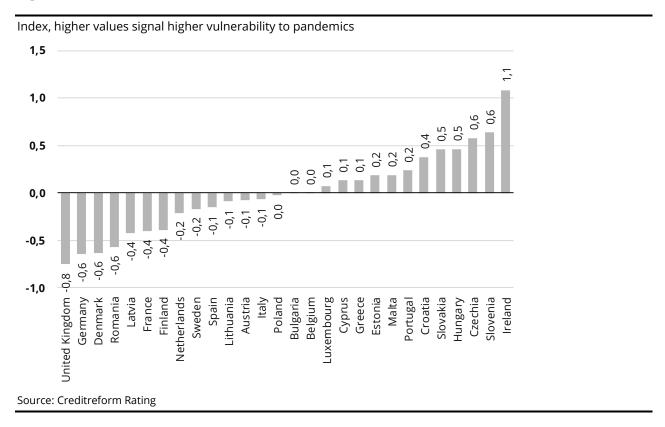


Figure 7: Risk factor Economic Structure





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Figure 8: Risk factor Labor Market

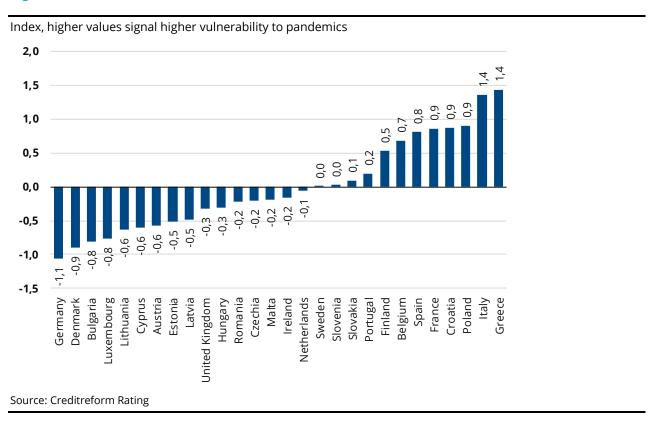


Figure 9: Risk factor Health System

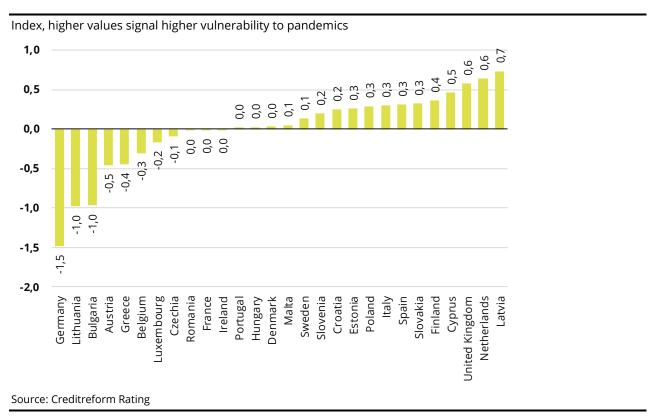




Figure 10: Risk factor Population

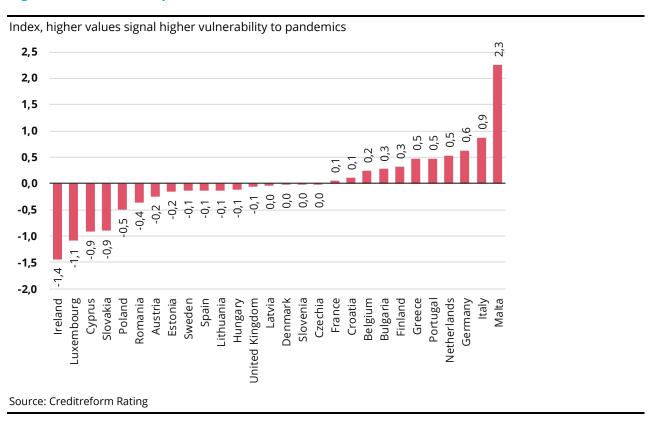


Figure 11: Risk factor Mobile Work Capacity

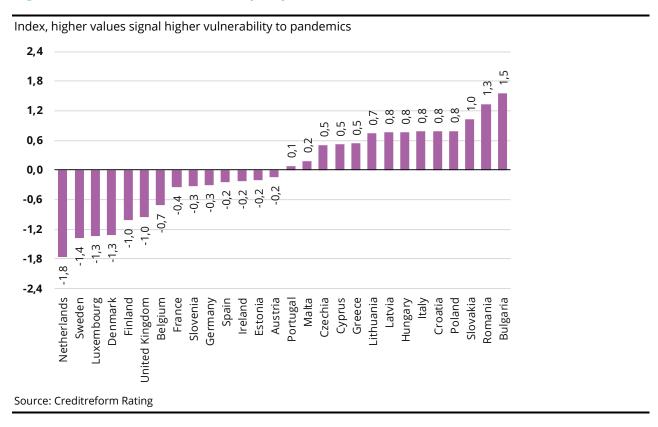




Figure 12: Discretionary fiscal measures in response to Covid-19 until 25 May 2020

Figures in % of 2019 GDP, liquidity assistance/guarantees (excluding central banks) shows the total volume of covered private sector loans/activities, not the amount that the government has set aside

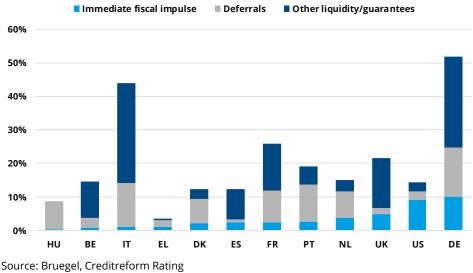
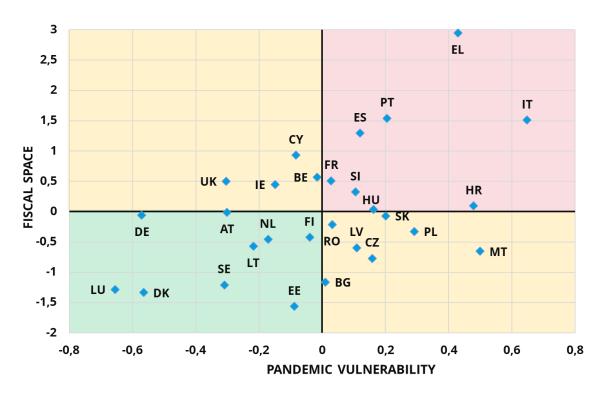


Figure 13: Pandemic Vulnerability vs. Fiscal Headroom

Pandemic Vulnerability Index: higher values signal higher vulnerability to pandemics; Fiscal Space (Z-score, tax revenues as % of government gross debt, 2019): higher values signal less fiscal leeway



Source: Eurostat, OECD, WHO, WTTC, Creditreform Rating

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Figure 14: Pandemic Vulnerability Heatmap

Indices, higher values signal a higher vulnerability to pandemics; the colored shades indicate the vulnerability depending on the index level, with dark green/blue = lowest relative vulnerability and dark red = highest relative vulnerability

	Economic Structure	Labor Market	Health Care System	Population	Mobile Work Capacity	PVI
Italy	-0,07	1,35	0,30	0,88	0,77	0,65
Malta	0,19	-0,19	0,05	2,26	0,18	0,50
Croatia	0,38	0,88	0,25	0,11	0,78	0,48
Greece	0,13	1,44	-0,45	0,47	0,54	0,43
Poland	-0,03	0,90	0,29	-0,50	0,79	0,29
Portugal	0,24	0,20	0,02	0,48	0,08	0,20
Slovakia	0,46	0,09	0,32	-0,90	1,02	0,20
Hungary	0,46	-0,31	0,02	-0,12	0,76	0,16
Czechia	0,58	-0,20	-0,09	-0,01	0,51	0,16
Spain	-0,15	0,81	0,31	-0,13	-0,25	0,12
Latvia	-0,42	-0,48	0,73	-0,04	0,76	0,11
Slovenia	0,64	0,03	0,19	-0,01	-0,32	0,11
Romania	-0,57	-0,22	-0,02	-0,36	1,33	0,03
France	-0,40	0,86	-0,01	0,05	-0,36	0,03
Bulgaria	0,00	-0,81	-0,97	0,27	1,55	0,01
Belgium	0,01	0,69	-0,30	0,24	-0,71	-0,02
Finland	-0,39	0,53	0,36	0,31	-1,01	-0,04
Cyprus	0,13	-0,60	0,46	-0,92	0,51	-0,08
Estonia	0,19	-0,52	0,26	-0,16	-0,21	-0,09
Ireland	1,09	-0,16	-0,01	-1,44	-0,23	-0,15
Netherlands	-0,21	-0,05	0,64	0,54	-1,77	-0,17
Lithuania	-0,08	-0,63	-0,98	-0,13	0,74	-0,22
Austria	-0,08	-0,57	-0,46	-0,24	-0,15	-0,30
United Kingdom	-0,75	-0,33	0,57	-0,05	-0,96	-0,30
Sweden	-0,17	0,01	0,13	-0,14	-1,39	-0,31
Denmark	-0,63	-0,90	0,03	-0,02	-1,31	-0,57
Germany	-0,64	-1,05	-1,48	0,63	-0,30	-0,57
Luxembourg	0,07	-0,77	-0,17	-1,08	-1,34	-0,65

Source: Creditreform Rating