



Friuli-Venezia Giulia

Potential Economic Impact of the COVID-19 pandemic

BAK Regional Economic Analysis

22 February 2021

Content

- Introduction
- Concept
- Exposure
- Sensitivity
- Resilience
- Benchmarking Sample
- Further Information

Potential Economic Impact of the Corona Crisis - Introduction

Why is the Corona crisis different?

- Unlike in the financial crisis from 2007-08, the (economic) damage of the pandemic did not start in one or two countries and expanded to other regions steadily. The virus and the accompanying response measures hit the important industrial hubs almost simultaneously.
- Economic crises typically start in single part of the entire system and continuously infect other sectors. For example, banking crises begin in the banking sector. Foreign exchange shocks originate in the respective exchange markets. In the case of the Corona crisis, the disruption appeared in several sectors at the same time.
- The response measures to the virus, that attempt to flatten the epidemiological curve, represent a two-sided shock. On the supply side, the closure of production plants and the disruption of supply chains lead to temporary shortages in affected markets. On the other side, the demand plunged in sensitive sectors such as tourism, wholesale and retail trade, transportation, arts, entertainment and recreation.

Potential Economic Impact of the Corona Crisis – Introduction

Triplet of economic shocks:

The virus triggered an economic shock that consists of three different types:

- I. The **pandemic restrains the production** by affecting the labour force through illness or quarantine. The consequences of this phenomenon are similar to a temporary hike of unemployment.
- II. The **response measures** to the virus that attempt to flatten the epidemiological curve by closing manufactures and offices, enforcing quarantines and restricting international traffic represent a two-sided shock.
 - supply shock (closure of production plants and disruption of supply chains)
 - demand shock (especially tourism, trade fairs, air traffic)
- III. Shocks concerning **expectations**; just as in the global financial crisis from 2007-08, consumers and businesses altered their behaviour by reducing consumption and withholding investments due to uncertainty about the epidemiological trend.

Source: Keeping the lights on: Economic medicine for a medical shock
Richard Baldwin 13 March 2020 (<https://voxeu.org/article/how-should-we-think-about-containing-covid-19-economic-crisis>)

Introduction

Potential Economic Impact of the Corona Crisis – Introduction

Scope of the analysis

The potential economic impact of the COVID-19 pandemic on the regional economy and society can be analysed in three dimensions: exposure, sensitivity and resilience. For each of these three dimensions various indicators will be analysed.

The study addresses the following questions.

- How exposed is Friuli-Venezia Giulia to the crisis?
- How strongly is Friuli-Venezia Giulia affected by the crisis depending on its economic structure?
- How resilient is Friuli-Venezia Giulia to the crisis?
- How strongly is Friuli-Venezia Giulia affected by the crisis compared to other regions (benchmarking sample)?

The analysis assesses the short-term impact of the crisis. What are the short-term potential effects on the regional economy? In the long-term the crisis might have effects on individuals' preference e.g. home office, living in more rural areas, etc. However, at the moment these long-term effects are still not fully understood.

Concept

Potential Economic Impact of the Corona Crisis – Concept

Potential economic impact on regions

The potential economic impact of the crisis on regions varies depending on their exposure, sensitivity and resilience.

- I. **Exposure:** The regions' exposure depend on how strongly the regions are affected by both, the virus itself (COVID-19 cases) and measures to fight the pandemic (restriction and health measures).
- II. **Sensitivity:** The restriction measures hit different sectors of the region's economy differently. The potential economic impact on the region's economy varies according to its economic structure.
- III. **Resilience:** Resilience refers to the regional capacity to reduce vulnerabilities, to resist shocks and to recover quickly. The ability to adapt to the crisis also varies across regions. Resilience can be fostered by policies that mitigate the risks and consequences of the crisis. The resilience towards the Corona crisis varies across regions depending their capacities such as possibilities to work from home, financial support etc.

Source: Böhme, K. and Besana, F. (2020): Understanding the territorially diverse implications of COVID-19 policy responses, Spatial Foresight Brief 2020:13

Concept

How to assess the potential economic impact of COVID-19 on regions?

COVID-19 Economic Impact

Exposure

How exposed is the region to COVID-19?
How strict are the policy measures?

Sensitivity

How strong is the potential impact based on the regional economic structure?

Resilience

How resilient is the region towards shocks?
How good can the region adapt?

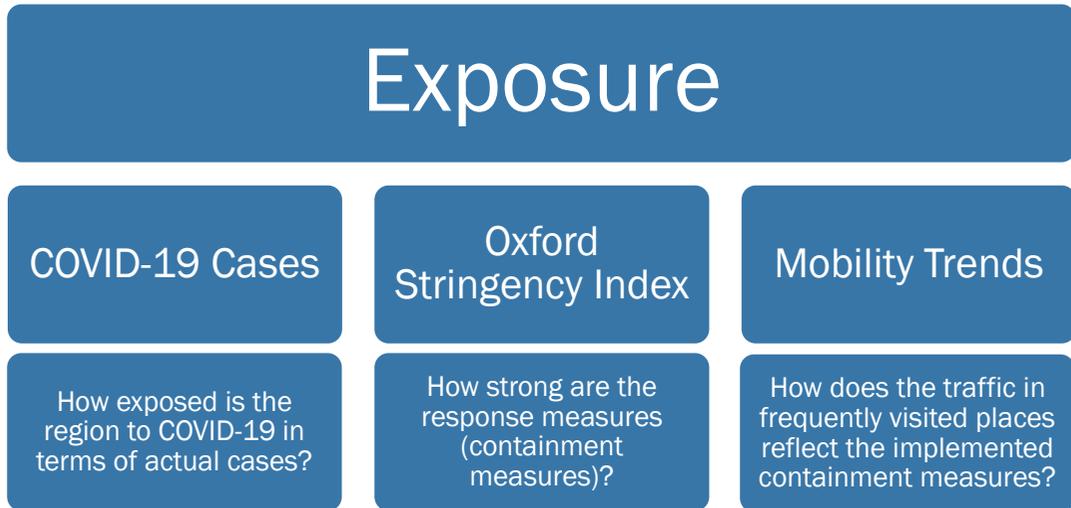
Source: BAK Economics

bak-economics.com

7

See Explanations on slides 5 and 6.

How to measure the potential economic impact of COVID-19 on regions?



Source: BAK Economics

Exposure

The outbreak of COVID-19 has a territorial dimension. To what degree the region is exposed to the COVID-19 pandemic can be measured by number of infections (COVID-19 cases) and policy intervention to fight the pandemic (containment measures).

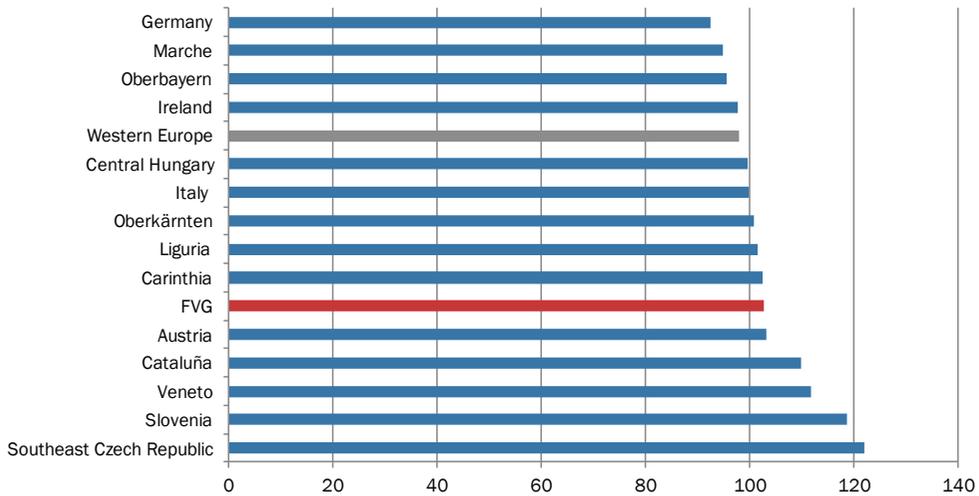
The quantity of infections also directly impacts the economy through the percentage of the work force who has to stay at home due to COVID-19 infections or quarantine. The regional exposure can therefore be measured by the number of excess new infections per 100,000 inhabitants per week (incidence).

The infection rate led to policy responses in terms of lockdowns. COVID-19 policy responses can be measured by the “government response stringency index” published by the Oxford University’s Coronavirus government response tracker. This composite index that assesses the stringency and length of the restriction measures offers a straightforward indication of lockdown features by country, by rigidity and how long these measures lasted. This enables us to perceive how European regions have been impacted by government restrictions and their negative effects on economic production and consumption.

The containment measures are implemented to slow down the spreading of the virus by enforcing physical distance between people. How effective have these policies been in reducing human movement? The reduction of human movement can be measured with data provided by Google Trends. These data indicate how much the mobility to certain destinations got reduced compared to the time before the start of the pandemic.

Exposure

Index of COVID-19 Excess Incidence



Note Index of COVID-19 cases per 100 000 inhabitants, 01 April 2020 to 17 January 2021, Korea data not available

Source BAK Economics, European Centre for Disease Prevention and Control (ECDC), Swiss Federal Office of Public Health (FOPH), UK Government

bak-economics.com

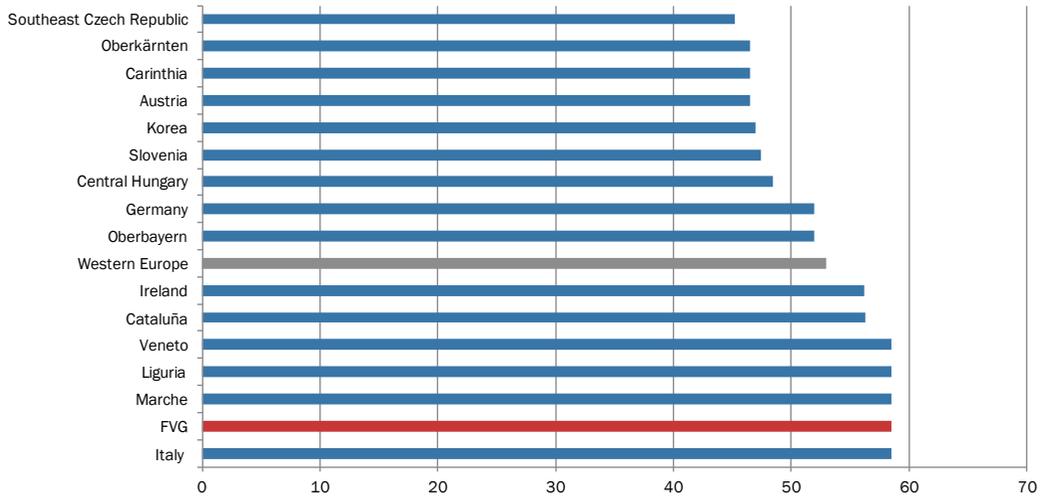
9

Index of COVID-19 Excess Incidence

COVID-19 infection rates were gathered from the European Centre for Disease Prevention and Control (ECDC), the Swiss Federal Office of Public Health (FOPH) and from the government of the United Kingdom. The numbers were provided as 14-days notification rates of new positive cases per 100 000 inhabitants (incidence). To account for the different quantity of testing capacities during the first peak in spring 2020 and the second wave, kicking-off in October, the weekly numbers of COVID-19 cases were adjusted by the prevailing European mean. First, an average score each week from April 2020 to January 2021 across the considered regions was computed. Then, this average is deducted from each region's current rate. Hence, a number above 0 represents a relatively high exposure to the Corona virus whereas a score below 0 implies that the respective region is less affected in this particular week (excess). Finally, the mean over the entire period for all the relevant regions is constructed. Hence, an overrepresentation of the second wave with higher numbers of cases due to enhanced testing compared to April 2020 is avoided. Afterwards, these scores were indexed. The average of all TL2 regions in the available European countries is set to 100. The corresponding standard deviation of the variable is set to 10. Regions with higher numbers of positive cases receive higher index values. For example, a score of 120 is two standard deviations above the European average. The available 20 European countries are the following: Austria, Belgium, Switzerland, Czech Republic, Germany, Denmark, Spain, Finland, France, Hungary, Italy, Ireland, Luxembourg, the Netherlands, Norway, Poland, Sweden, Slovenia, the Slovak Republic and the United Kingdom.

The index of COVID-19 excess incidence indicates that Friuli-Venezia Giulia is more exposed to the virus than the national average of Italy. However, Friuli-Venezia Giulia is less affected than the Veneto region. Also, considerably more exposure is located in the adjacent Slovenia and Southeast Czech Republic.

Exposure Oxford Stringency Index



Note Data on national level, 2020 annual average of the Oxford Stringency Index: 0=no measure, 100=maximum measures

Source University of Oxford, BAK Economics

bak-economics.com

10

Oxford Stringency Index

The Stringency Index is provided by the University of Oxford. The index covers a range of measures from governments that are supposed to avoid an uncontrolled spread of the Corona virus.

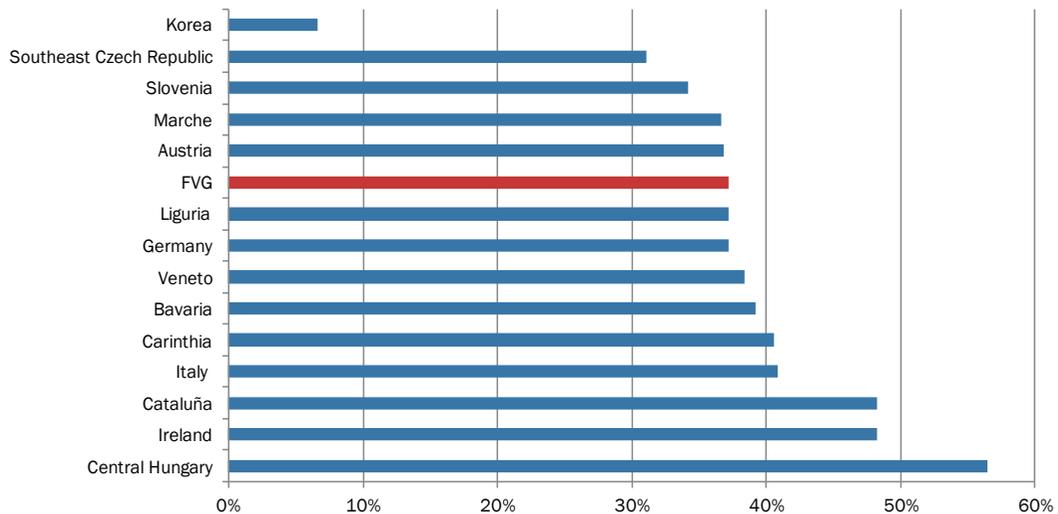
Following variables affect the score: school and workplace closing, cancellation of public events, restrictions on gatherings, closure of public transport, stay-at-home requirements, restrictions on internal movement and international travel controls.

The Stringency Index ranges from 0, which represents no containment policy, to 100, which would imply a maximum of possible response measures. In an economic view, the implication of more stringent measures has a negative impact on the regional economy. The depicted values refer to the mean of the stringency index for the whole year 2020 on a national level.

As depicted in the graph, the Italian regions were affected by more rigorous measures than all other benchmark regions and Western Europe.

Exposure

Mobility Trends – Workplace



Note Drop of traced mobility in workplaces on selected dates compared to baseline. Oberbayern = Bavaria

Source Google Mobility Trends, BAK Economics

Mobility Trends - Workplace

The mobility reports are provided by Google. Thereby, the so-called headline number is used to measure activities around places that may be affected by policies in response to the Corona pandemic. In this case, the indicated value is the traced mobility in workplaces compared to the baseline. As a baseline day, the median for each of the seven days of the week is calculated from the 5-week period between 3 January – 6 February 2020. The data represents the mean of five different Fridays which cover the complete time frame of the pandemic. Precisely, the following dates are represented: 27/03/2020, 22/05/2020, 21/08/2020, 23/10/2020, 08/01/2021.

Since the depicted values refer to Fridays, the baseline is accordingly constructed from the five Fridays in the mentioned period (3 January – 6 February 2020). Because of stay-at-home policies, closures of shops or other measures, the mobility is usually lower than in the baseline period before the breakout of the Corona virus. For better illustration, however, the algebraic sign was reversed. Hence, a score of 50% implies that the reported mobility in this certain place was half of the mobility of the baseline.

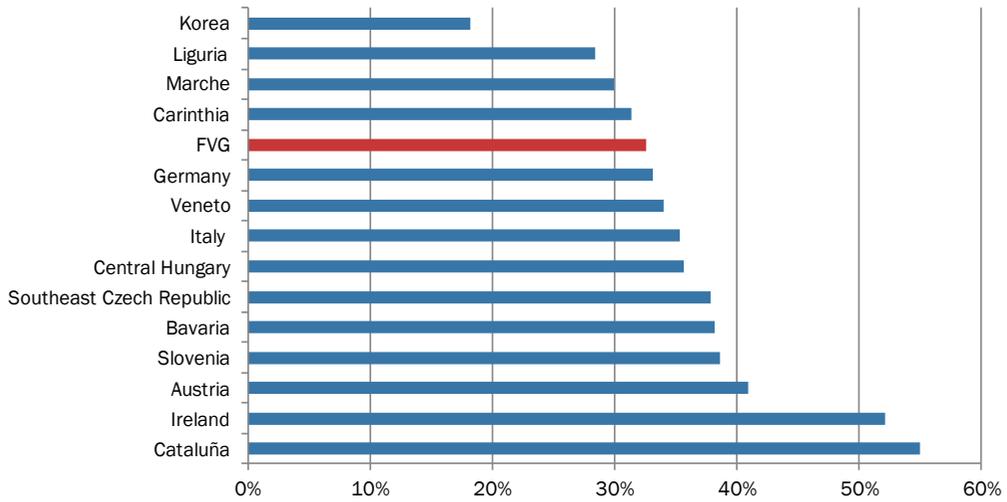
The data refer to the mobility in workplaces. As mentioned, many workplaces were affected by different response measures. Thus, the regional exposure is supposed to be positively correlated with the reduction in mobility of this category.

The mobility around workplaces in Friuli-Venezia Giulia is diminished by over 36 percent compared to the baseline period. This reduction is below Italy's national average of 41 percent.

The reduction in mobility was higher in most of all other benchmarking regions. It was particularly high in Central Hungary, while the reduction was very low in Korea.

Exposure

Mobility Trends – Retail and Recreation



Note Drop of traced mobility in retail shops or places of recreation on selected dates compared to baseline. Oberbayern = Bavaria

Source Google Mobility Trends, BAK Economics

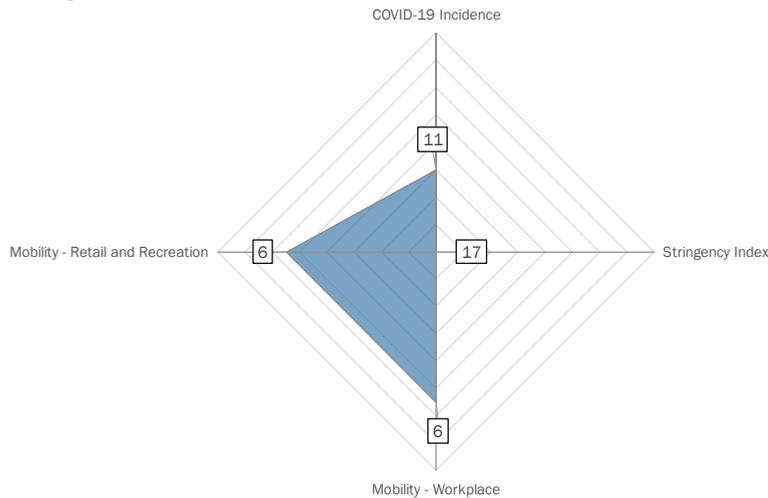
Mobility Trends – Retail and Recreation

The mobility reports are provided by Google. Thereby, the so-called headline number is used to measure activities around places that may be affected by policies in response to the Corona pandemic. In this case, the indicated value is the traced mobility in retail shops or places of recreation compared to the baseline. As a baseline day, the median for each of the seven days of the week is calculated from the 5-week period between 3 January – 6 February 2020. The data represents the mean of five different Fridays which cover the whole time of the pandemic. Precisely, the following dates are represented: 27/03/2020, 22/05/2020, 21/08/2020, 23/10/2020, 08/01/2021. Since the depicted values refer to Fridays the baseline is constructed from the five Fridays in the mentioned period (3 January – 6 February 2020). Because of stay-at-home policies, closures of shops or other measures, the mobility is usually lower than in the baseline period before the breakout of the Corona virus. For better illustration, however, the algebraic sign was reversed. Hence, a score of 50% implies that the reported mobility in this certain place was half of the mobility of the baseline.

The data refer to the mobility in the category retail and recreation. As mentioned, many shopping centres, restaurants, museums and others were affected by different response measures. Thus, the regional exposure is supposed to be positively correlated with the reduction in mobility this category.

The mobility around retail stores and places of recreation in Friuli-Venezia Giulia is diminished by one-third compared to the baseline period. This reduction is higher than in Liguria and Marche but below the levels of Veneto and the national average. Further, the reduction is higher in most of the other European benchmarking regions, with peaks noted in Ireland and Catalonia.

Exposure Summary – Exposure



Note 17 = last rank respectively highest exposure, 1 = top rank respectively lowest exposure, Stringency Index with data on national level and Italy ranked last

Source BAK Economics, European Centre for Disease Prevention and Control (ECDC), Swiss Federal Office of Public Health (FOPH), UK Government, University of Oxford, Google

bak-economics.com

13

Summary – Exposure

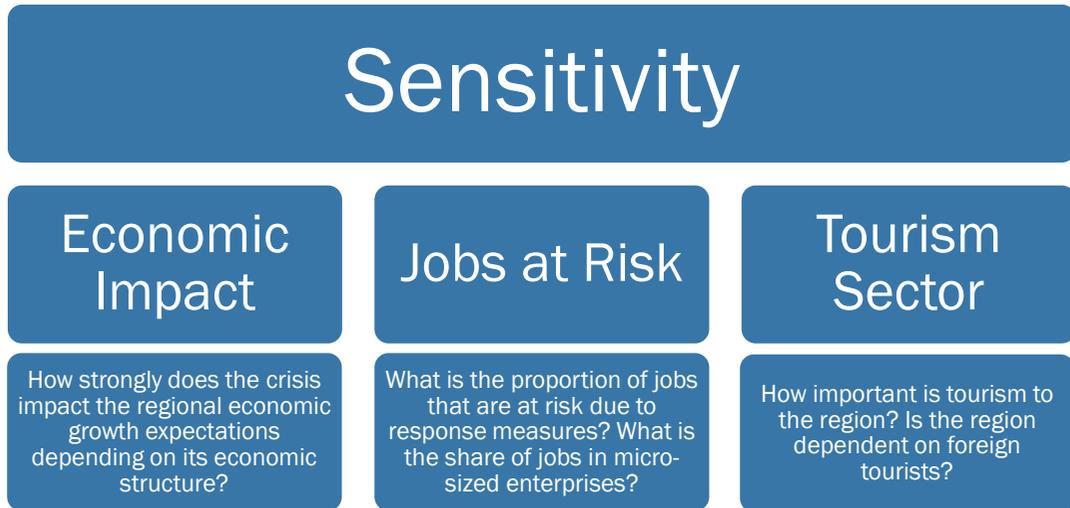
The graph summarizes the rankings of the peer group shown before in the bar charts of selected exposure indicators. Hereby, a high exposure in a certain indicator leads to a low ranking whereas a top ranking results from a low exposure. Because of the selected 17 benchmarking regions, the ranking ranges from the 17th to the 1st place. Since the Stringency Index is on national level, Friuli-Venezia Giulia receives the ranking of Italy which is the last out of the ten countries in the peer group. Applied on the scale from 1-17, the ranking of Friuli-Venezia Giulia is 17.

At a glance, Friuli-Venezia Giulia is ranked in the bottom half in two categories, Index of excess COVID-19 incidence and, to some extent as a consequence thereof, the strictness of response measures. Regarding both of the mobility trends, however, the exposure was lower in Friuli-Venezia Giulia than most of the benchmarking regions.

The benchmarking sample consists of all the analysed regions. Further, if no data is available, the according regions received an unweighted average of the group or, where possible, the value from a higher territory unit. For example, Carinthia's score is assigned to Oberkärnten if the indicator is not provided for the according subregion.

Concept

How to measure the potential economic impact of COVID-19 on regions?



Source: BAK Economics

bak-economics.com

14

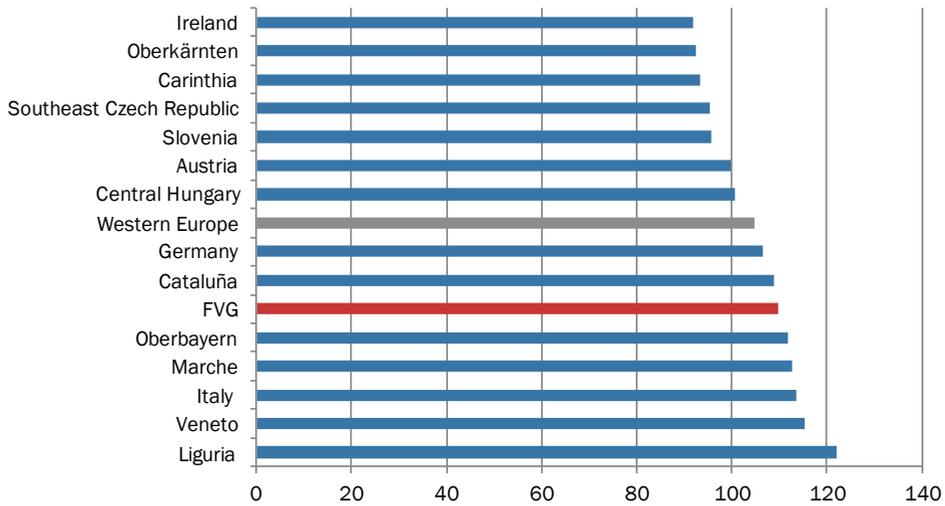
Sensitivity

The question how sensitive the regional economy reacts to the COVID-19 policy responses can be assessed through an analysis of its economic structure. The crisis affects sectors in different ways. Air traffic, tourism and the entertainment industry are certainly among the most negatively affected, whereas online services have tended to benefit. Depending on the sector, the effects vary in strength and duration. The crisis will therefore have an ambiguous and differently lasting impact on the respective regions, depending on the economic structure. In general, a high sensitivity indicates a rather vulnerable economy to the restriction measures.

The economic impact is analysed by applying the changes in forecasts on gross value added growth rates with the prevailing sectoral structure in each region. Typically, regions with high exposure in negatively affected sectors suffered the most severe declines in economic growth perspectives. Then, the relevant regions were examined regarding the mentioned sectors at risk and how dependent their economy is on these industries. A special focus is put on tourism. Touristic areas have experienced the initial shock by the closing of international borders and, secondly, will have a difficult recovery with long-lasting restrictions and uncertainties about the trend of the pandemic (European Union, 2020). Especially regions with a strong dependence on foreign tourists are expected to be dealing with the consequences of COVID-19 (European Union, 2020). To account for this phenomenon, data on the share of foreign tourists in hotels and other accommodations before the pandemic is consulted. Independent from the industry, small and micro-sized enterprises are also seen as a particular risk factor because they tend to have fewer financial capacities to absorb economic shocks. Further, labour markets face more difficulties by reallocating the labour force (European Union, 2020). The scale of micro-sized enterprises is reflected by the indicator share of employees in such enterprises.

Source: European Union (2020). *Potential impacts of COVID-19 on regions and cities of the EU*. doi:10.2863/56992

Sensitivity Index of Economic Impact



Note Change of forecasts 2019 to 2020 weighted with the structure of the respective regional economy, no data available for Korea

Source BAK Economics, OEF

bak-economics.com

15

Index of Economic Impact

To take the economic impact of the Corona pandemic on the European regions into account, the forecasts for Europe from 2019 before the spread of COVID-19 to the updated forecasts from November 2020 are compared. The reductions of these forecasts are applied on the regional economic structure. The indicator shows the changes of economic forecasts (changes in sectorial growth rates) in 2020 compared to those of 2019 for 113 sectors multiplied with the employment structure of the respective region.

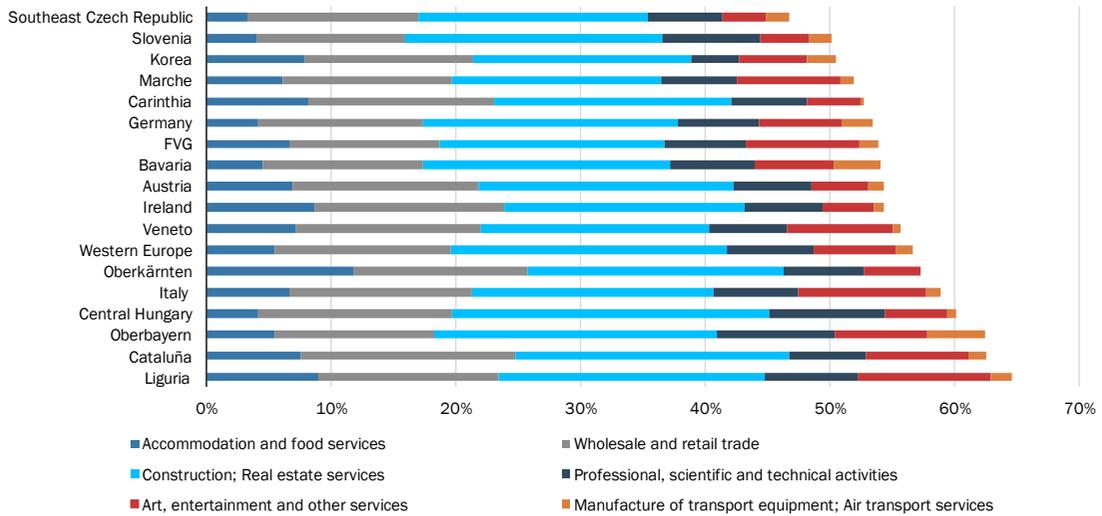
The reduction in growth expectations were particularly high in sectors such as tourism, transport and storage, manufacturing (particularly of vehicles), aerospace and other services, whereas the pharmaceutical industry benefited. This indicator delivers valuable information about the economic sensitivity to the crises.

The average of TL2 in European countries is set to 100. The standard deviation of the variable of the same set is set to 10. An index value of 110 means the region is one standard deviation more negatively impacted by the COVID-19 pandemic than the average.

The data suggest that Friuli-Venezia Giulia's economy might be particularly strongly affected compared to Western Europe. In the Italian context, the region is around the national mean. All Italian regions react more sensitive to the crisis, as they belong to the most affected regions of the benchmarking sample. However, Friuli-Venezia Giulia appears to be slightly less affected than the other Italian regions, Marche, Veneto and Liguria.

Sensitivity

Share of Jobs at Risk from COVID-19 Containment Measures



Note In percentage of total employment, 2019, Oberbayern = Bavaria

Source BAK Economics, OECD, National Statistical Offices, OEF

Share of Jobs at Risk from COVID-19 Containment Measures

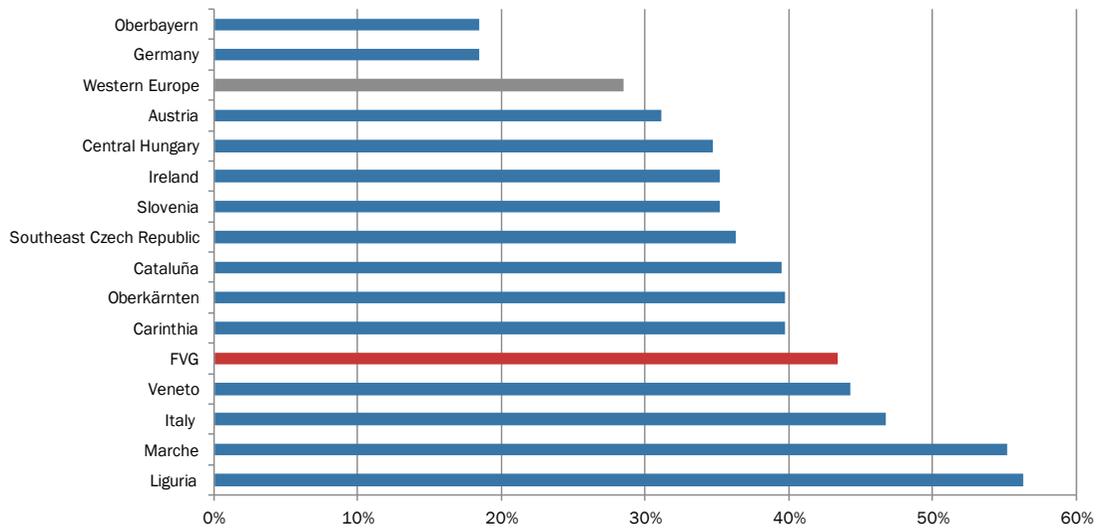
Jobs at risk due to the recent pandemic are defined by the OECD (2020) as those that are related to travelling and work that requires direct contact between consumers and service providers. More precisely, the OECD (2020) categorized jobs of the following sectors particularly at risk because of the containment measures:

- Accommodation and food services
- Wholesale and retail trade
- Construction and real estate services
- Art, entertainment and other services
- Professional, scientific and technical activities
- Manufacture of transport equipment and air transport services

The structure of the labour market in Friuli-Venezia Giulia shows overall a smaller proportion of jobs in the affected sectors than most of the other regions of the benchmarking sample. It is positioned in the upper third of the ranking. Friuli-Venezia Giulia has a lower percentage of jobs at risk than Western Europe and Italy.

Source: OECD (2020), Job Creation and Local Economic Development 2020: Rebuilding Better, OECD Publishing, Paris, <https://doi.org/10.1787/b02b2f39-en>.

Sensitivity Share of Jobs in micro-sized enterprises



Note Share of all employees working in enterprises with staff up to 9 FTE, 2017, no data available for Korea

Source BAK Economics, Eurostat, European Commission

bak-economics.com

17

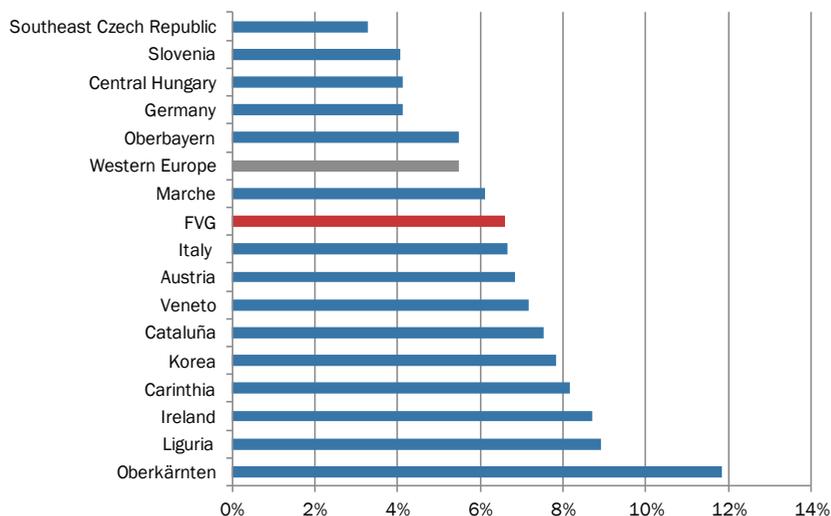
Share of Jobs in micro-sized enterprises

Small enterprises with up to nine employees are considered to suffer from liquidity shortages more immediately in case of workplace and shop closures. Thus, they are directly affected and have less capacities to deal with the economic shock (European Union, 2020). Hence, a higher share of employees working in small companies leads to a higher sensitivity.

Friuli-Venezia Giulia shows a significantly higher share in micro-sized enterprises than the Western European mean and most of the benchmark regions. Yet, in contrast to the other Italian regions and the national mean, the share is lower in Friuli-Venezia Giulia. In general, the range of the distribution is remarkably wide with a maximum of 56 percent in Liguria compared to the minimum value of 18 percent stated in Upper Bavaria (Oberbayern) and Germany.

Source: European Union (2020). *Potential impacts of COVID-19 on regions and cities of the EU*. doi:10.2863/56992

Sensitivity Share of Jobs in Tourism Sector



Note Number of employees in tourism divided by total employment in persons, 2019

Source BAK Economics, OECD, National Statistical Offices, OEF

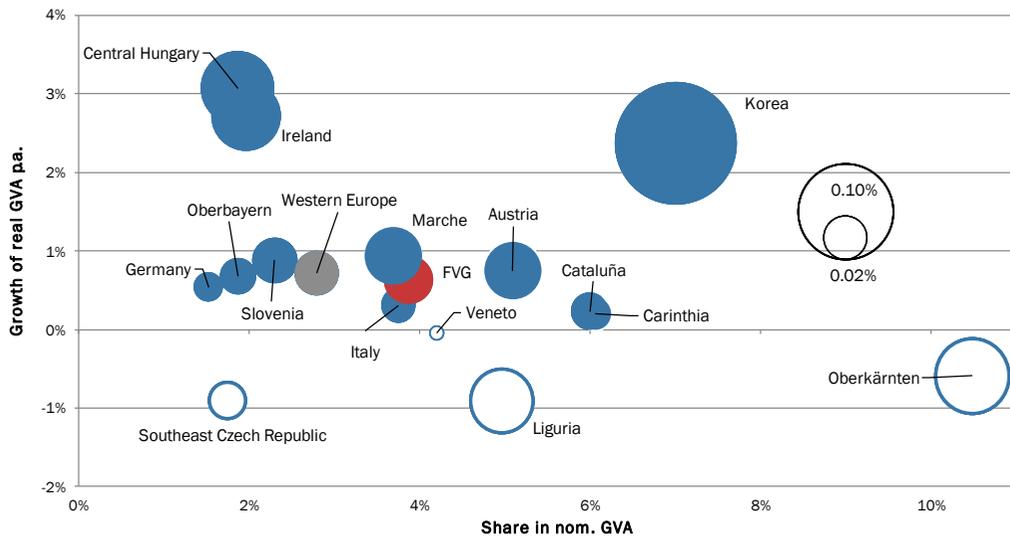
Share of Jobs in Tourism Sector

The ratios are calculated by taking the employment in the tourism sector and divide it by the total employment within a certain region. The tourism sector includes short-stay accommodation as well as food and beverage service activities.

The tourism sector was among the most affected by the response policies to the pandemic. On one hand, the constraints on international traffic led to a significant plunge in foreign demand. On the other hand, the sector itself is directly affected by closures of restaurants, hotels and other services in accommodation. Therefore, a high share of jobs in tourism-related activities represents an enhanced risk to the regional labour market.

The proportion of jobs in tourism in Friuli-Venezia Giulia is slightly higher than in Western Europe and on the same level as the national mean. But its economy is less depended on tourism than most of the Italian, Spanish and Austrian regions of the benchmarking sample. The share of jobs in tourism is also higher in Korea and Ireland compared to Friuli-Venezia Giulia.

Sensitivity Growth Contribution: Tourism Sector



Note Total share of nominal gross value added and real gross value added growth, 2009–2019
 Source BAK Economics, OECD, National Statistical Offices, OEF

Growth Contribution Tourism Sector

This chart presents the growth contribution of tourism for the benchmarking regions. The graph is based on gross value added.

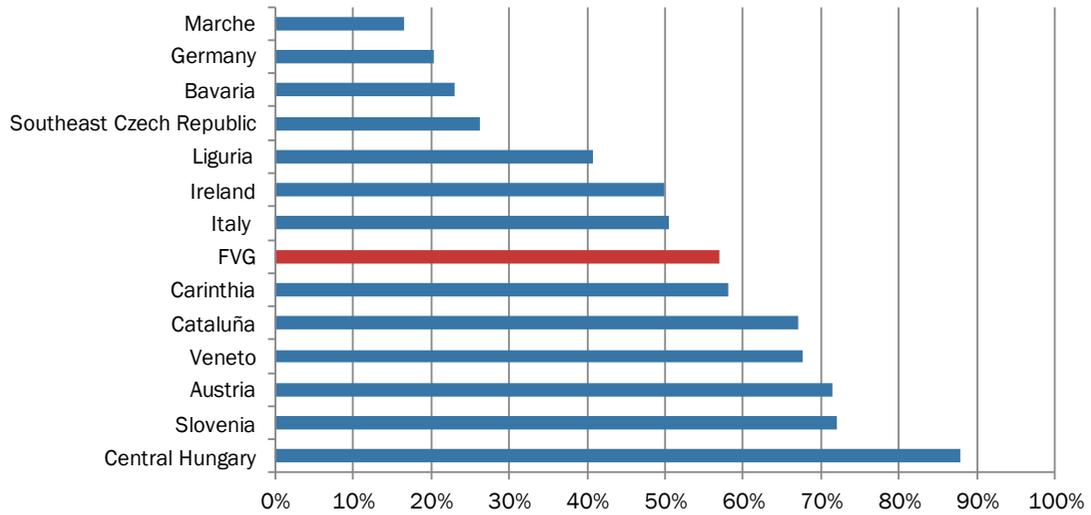
The x-axis conveys information on the share (in percent) and y-axis reflects the average annual growth (in percentage points) of the sector between 2009-2019. Therefore, the growth contribution of a sector increases when moving from the lower left corner towards the right and/or upwards. As the relationship is non-linear, the growth contribution is also given in the graph: the size of the bubbles reflects the growth contribution.

The contribution of the industry to the growth of a region is measured by its weight in the total economy as well as its respective growth rate. Therefore, a large contribution to growth will be the result of a relatively high share undergoing moderate growth, or alternatively, a relatively small share with a more dynamic development.

In Friuli-Venezia Giulia, the tourism sector grew moderately over the last decade with an average share of around four percent of the nominal gross value added. The growth contribution in Friuli-Venezia Giulia was higher than in Italy due to higher growth rates and also more distinctive than in the aggregate Western Europe where the share is lower.

Sensitivity

Foreign Residents in Tourist Accommodations



Note In percent, 2019. No data available for Korea, Oberkärnten and Western Europe. Oberbayern = Bavaria.

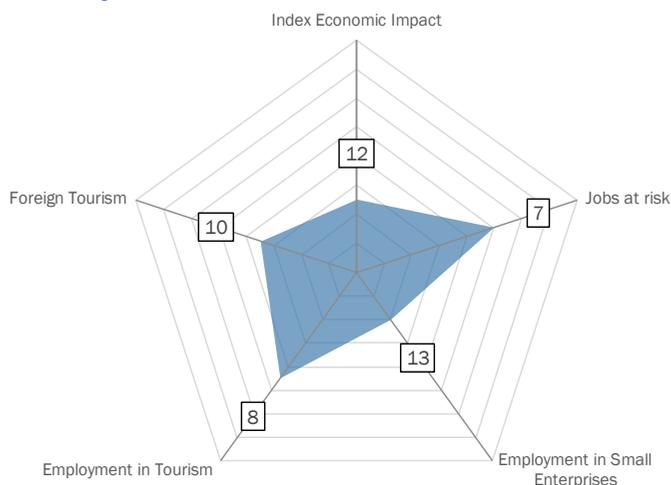
Source BAK Economics, Eurostat

Foreign Residents in Tourist Accommodations

As stated before, tourism and related activities have been strongly affected by the response measures. Not only the forced closure of tourist accommodations have led to collapse of utilised capacity but also restrictions on international mobility after re-opening. This indicator is used to capture the dependency on foreign tourists. Therefore, data on the share of tourists from abroad in terms of spent nights at tourist accommodation establishments is considered. Restrictions in international travelling and the temporary closure of borders put a considerable risk on exposed destinations.

In Friuli-Venezia Giulia, tourists from abroad represent more than half of all customers in hotels or other accommodations. This figure is above the national mean where the ratio is balanced. Nevertheless, there are a number of other benchmarking regions with considerably higher shares of international guests. The peak value is stated in Central Hungary with 88 percent. On the other side of the distribution, only 17 percent of all nights spent in tourist accommodations in the Italian region Marche are attributed to non-residents.

Sensitivity Summary – Sensitivity



Note 17 = last rank respectively highest sensitivity, 1 = top rank respectively lowest sensitivity

Source BAK Economics, OECD, National Statistical Offices, OEF, Eurostat, European Commission

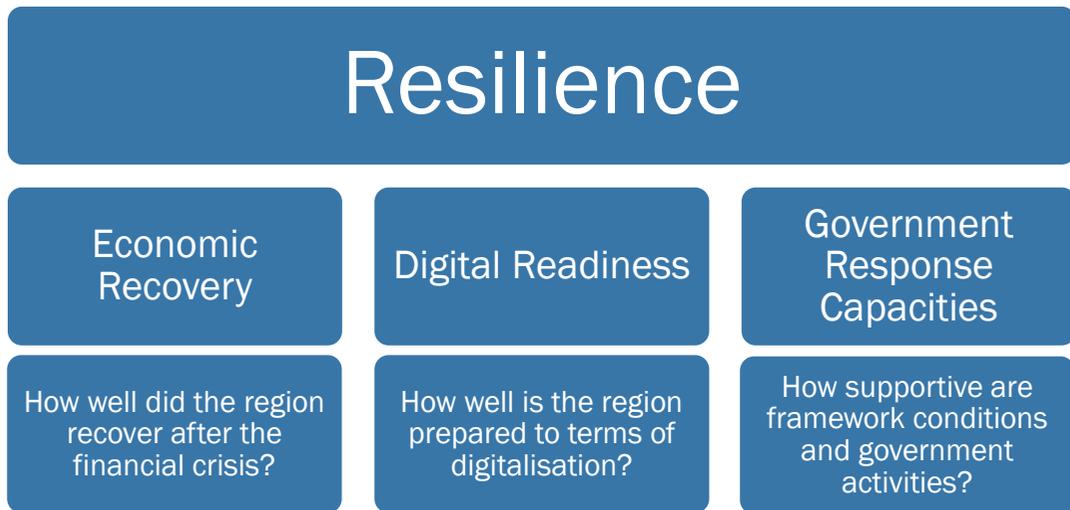
Summary – Sensitivity

The graph summarizes the rankings of the peer group shown before in the bar charts of selected indicators for sensitivity. Hereby, a high sensitivity in a certain indicator leads to a low ranking whereas a top ranking results from a low sensitivity. Because of the selected 17 benchmarking regions, the ranking ranges from the 17th to the 1st place.

Friuli-Venezia Giulia is ranked in the bottom half in three of the five categories. These are the index of economic impact, which implies a strong downward correction of economic forecasts in sectors which are dominant in Friuli-Venezia Giulia. Further, the high proportion of employees in small enterprises and the dependency on international tourists lead to low ranks in the respective categories. Moderately better is the situation concerning the share of employment in tourism and jobs at risk. Still, regarding the analysed factors, Friuli-Venezia Giulia seems to be more sensitive to the prevalent economic shock compared to the benchmarking sample.

The benchmarking sample consists of all the analysed regions. Further, if no data is available, the according regions received an unweighted average of the group or, where possible, the value from a higher territory unit. For example, Carinthia's score is assigned to Oberkärnten if the indicator is not provided for the according subregion.

How to measure the potential economic impact of COVID-19 on regions?



Source: BAK Economics

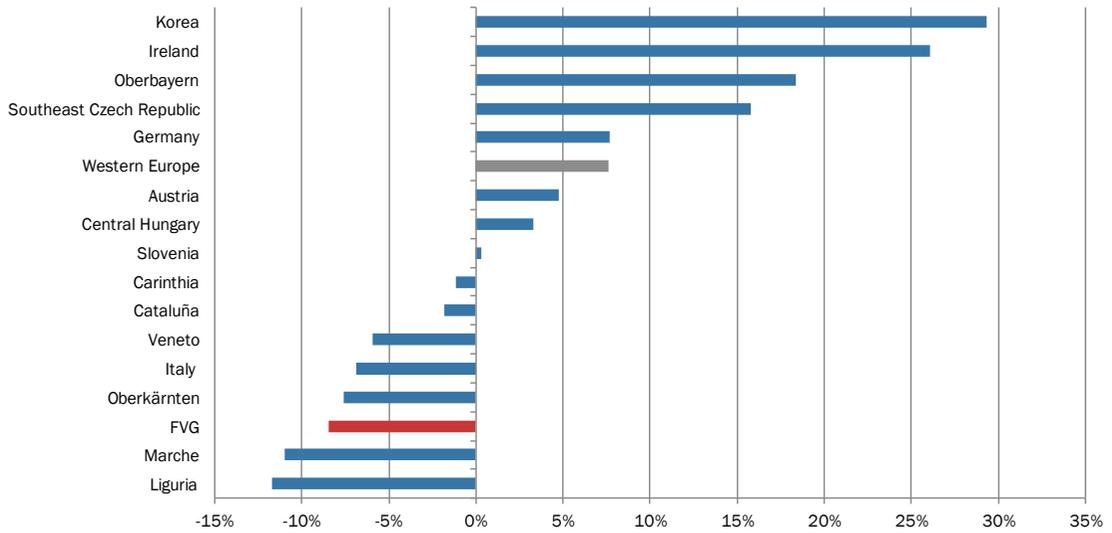
Resilience

Unanticipated shocks like the recent pandemic could occur anytime and in any region. They could lead to severe damages to the regional economy. Therefore, robustness against particular shocks, the ability to adapt fast to the new situation and a swift recovery indicate a solid economic resilience (Caldera Sánchez et al., 2017). Resilience can be measured by standard macroeconomic indicators such as GDP, gross value added or unemployment rates which provide quantitatively and qualitatively good data (ESPON, 2014). However, these variables have limited validity to the long-term resilience. To cover this aspect, additional indicators could be integrated for example to evaluate the economic diversity or other indicators that are related to structural transitions such as digitalisation.

In this study, macroeconomic data from the financial crisis in 2007-08 have been exploited to examine how fast regions recovered in terms of their economic power (gross value added) as well as their labour market. High levels of digital infrastructure and a strong IT sector is advantageous in times of shutdowns. The coverage of broadband access in households and the availability of skilled IT personnel provide a constructive basement towards digitalisation. Combined with the qualification of the labour force and the share of jobs that are amenable to teleworking, the conditions towards successful adaption via digitalisation are evaluated. While containment measures have restricted economic activity in some sectors, the rapid expansion of teleworking has helped to maintain other jobs. Another aspect concerning economic resilience is the governmental capacity to execute anti-cyclical fiscal policies. Therefore, the debt ratio to the GDP is assessed on national level. Further, the economic support by governments during the corona pandemic is captured. Especially in the context of a pandemic, the stability of the health sector contributes decisively to the resilience. Hence, the number of employees in the respective sectors per 100 000 inhabitants in its development over the last ten years is analysed. In addition, framework conditions that allow to adapt more easily such as flexibility of the labour market and the general conditions for doing business are taken into account, too.

Resilience

Economic Growth after the Financial Crisis (2007-15)



Note Growth in percent of total gross value added between 2007 and 2015

Source BAK Economics, OECD

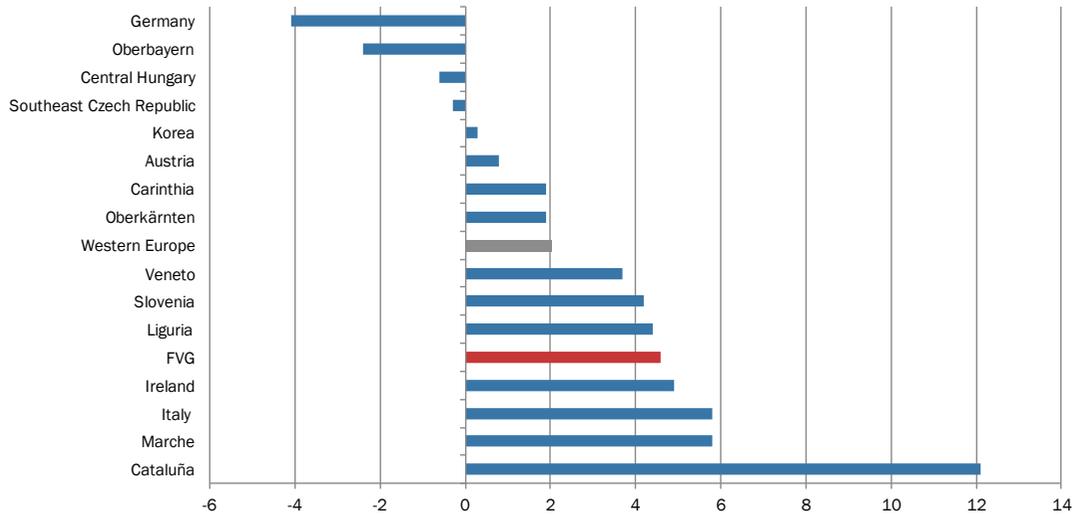
Economic Growth after Financial Crisis (2007-2015)

The resilience to crises is measured by how well the regions recover after economic recessions. Therefore, growth rates of total gross value added (GVA) from the global financial crisis, beginning in 2007, until the year 2015 are exploited.

In this period, the Italian regions, including Friuli-Venezia Giulia, suffered during the crisis and were not able to compensate the losses in the subsequent years. Meanwhile, Western Europe gained 7.5 percent of economic power in the same time. The top value in the benchmark group refers to Korea with a growth of 29 percent of its total GVA whereas the most unpleasant development is observed in Liguria with a loss of 12 percent of its economic power.

Resilience

Changes in Unemployment after the Financial Crisis (2007-15)



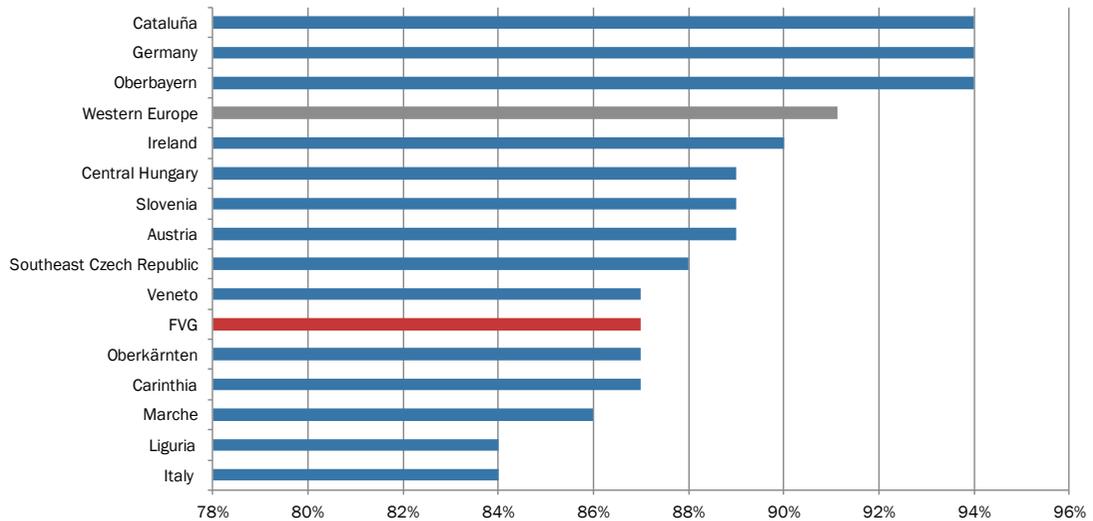
Note Difference in percentage points of unemployment rate between 2007 and 2015

Source BAK Economics, OECD

Changes in Unemployment after the Financial Crisis (2007-15)

This indicator refers to the development of the unemployment rate from 2007-2015 in percentage points. Thereby, the recovery of the labour market after the financial crisis is taken into account. A high difference, as in Catalonia for example, refers to a drastically risen rate of unemployment whereas low or even negative differences, like in Germany, indicate a strong resilience of the labour market. Friuli-Venezia Giulia experienced an increase of 4.6 percentage points from 2007-2015. This increase is below the national level of Italy but significantly higher than the Western European average. As depicted in the graph, there are various benchmarking regions that realised a decreasing rate of unemployment.

Resilience Broadband Access



Note Share of households with broadband access, no data available for Korea

Source BAK Economics, Eurostat

bak-economics.com

25

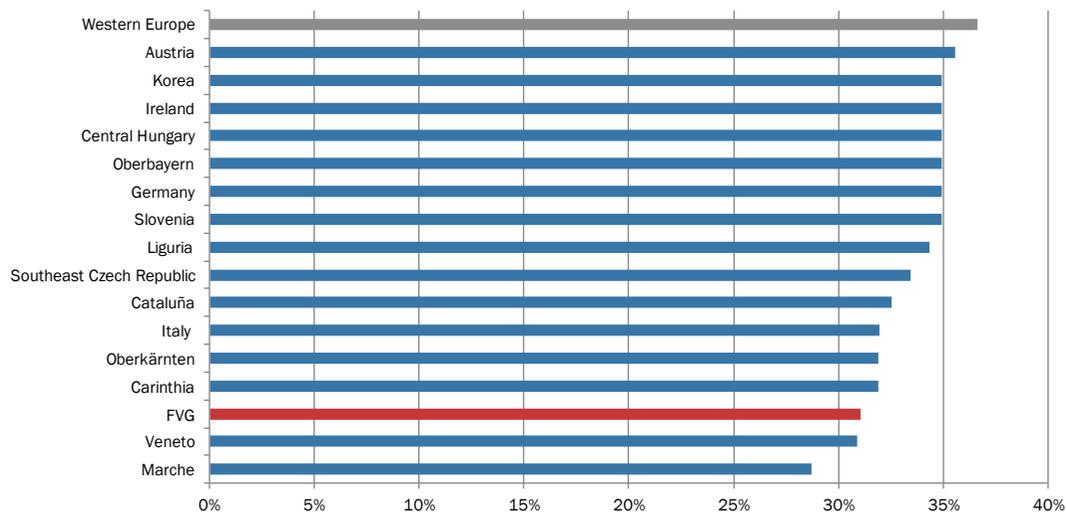
Broadband Access

To measure the region's capabilities regarding digital readiness, the variation in the coverage of broadband internet access is exploited. The indicator represents the share of households that is connected to a broadband access. With respect to global pandemics such as COVID-19, teleworking, home-schooling and digital communication in general became key factors to mitigate the spread of the virus. The abandonment of physical presence in schools and universities or the closure of international borders led to an unprecedented outsourcing of these activities into the digital space. Hence, an appropriate infrastructure to carry out these tasks from home is essential.

Friuli-Venezia Giulia has a coverage of 87 percent of all households that are endowed with broadband access. This value is between the Italian average of 84 percent and Western Europe with 91 percent. Overall, the share of households with broadband access is in the Italian regions of the benchmarking sample as well as in Carinthia at the bottom of the ranking.

Resilience

Share of Jobs amenable to Teleworking



Note In percentage of total employment, 2018

Source BAK Economics, OECD

bak-economics.com

26

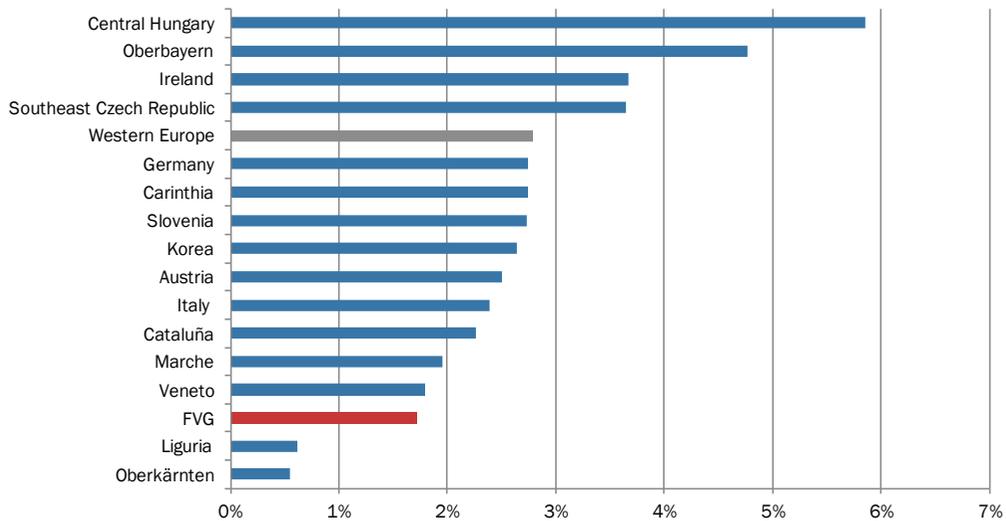
Share of Jobs amenable to Teleworking

The indicator illustrates what proportion of the employed can execute their job at home. The higher the share, the less affected is a region by the Corona response measures because more employees can continue their work from home. Thus, a positive correlation between this indicator and the resilience is assumed.

Widespread teleworking is more feasible in some regions than others. The share of jobs amenable to teleworking varies roughly by 10 percentage points across regions, from 37 percent in the Western European average to 27 percent in Marche.

Friuli-Venezia Giulia has a share of 31 percent of jobs that are amenable to teleworking. This proportion is slightly less than the Italian average and explicitly less than the Western European average, which is the highest value in the examined peer group. Friuli-Venezia Giulia has the lowest percentage of jobs amenable to teleworking compared to the international regions of the benchmarking sample.

Share of Jobs in ICT Sector



Note Number of employees in ICT divided by total employment in persons, 2019

Source BAK Economics, OECD, National Statistical Offices, OEF

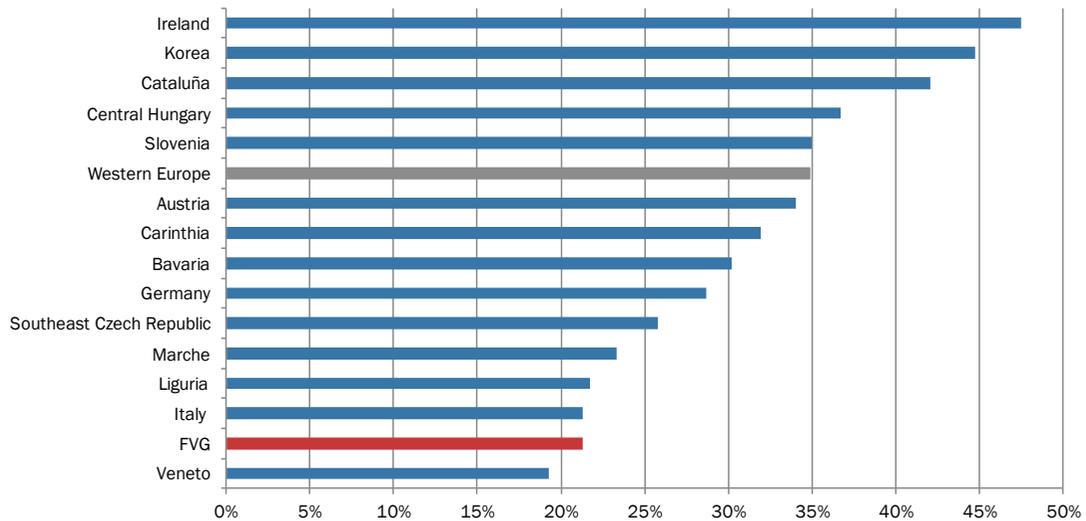
Share of Jobs in ICT Sector

Share of Jobs in the ICT Sector is measured as the percentage of employment in the ICT Sector divided by total employment within a certain region.

Jobs in the ICT sector are seen as crucial elements to implement the digital transformation. Especially in a situation like the COVID-19 pandemic, educated IT experts could assist employees who are working at home or introduce innovative tools to the home office. Therefore, a high share of jobs in this particular sector is considered positive regarding the adaptability to the crisis.

FVG contains a relatively small share of jobs in the ITC sector compared to the national or the Western European mean. Four of the benchmarking regions have significantly higher shares of ICT personnel than the other regions and Western Europe. With almost 6 percent, Central Hungary has the top value in the peer group. Combined with the previously discussed indicators, broadband access and jobs amenable to teleworking, the small share of employees in the ICT sector reveals a considerable deficit regarding the digital readiness in Friuli-Venezia Giulia.

Qualification of Labour Force



Note Share of labour force (in %) with attained tertiary education, 2017. Korea 2016, Oberbayern = Bavaria.

Source BAK Economics, OECD

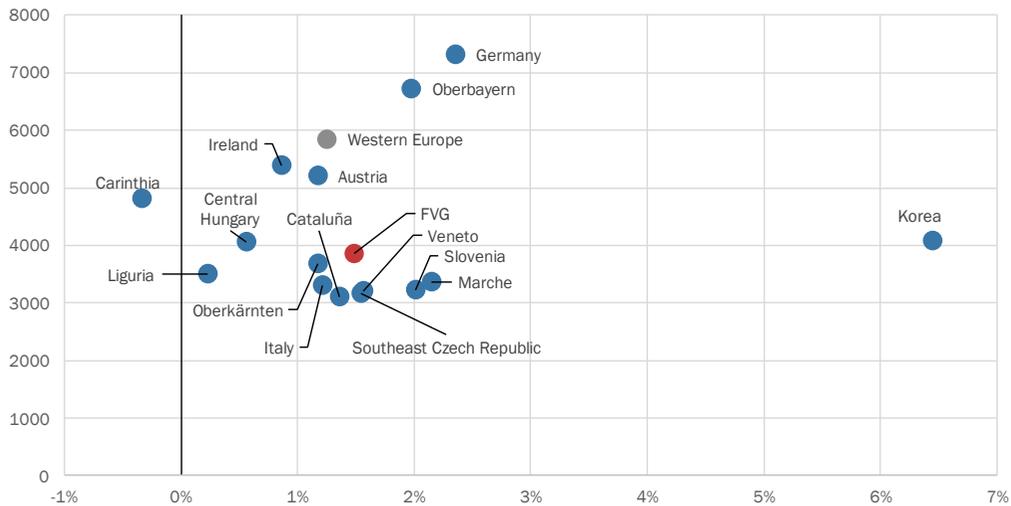
Qualification of Labour Force

As industries in highly developed countries create gradually more complex jobs, human capital is becoming increasingly crucial. Human capital is understood as the sum of skills, creativity and knowledge of all people living or working in a region and contributing to the economic success of firms and the economy in general. Further, regarding the pandemic response measures, complex work in the service industries could be adapted faster to teleworking. Hence, a well-educated labour force is assumed to be a factor that is positively correlated to the region's resilience.

Human capital can be appropriately assessed by looking at the highest level of formal education in a population. Therefore, the share of total labour force with a tertiary degree is used as a proxy variable. The educational attainment of the labour force is only available for larger administrative regions (Territorial Level 2 or NUTS 2).

The region Friuli-Venezia Giulia is among the Italian average with 21 percent of its population having a tertiary education. However, this number is significantly below the Western European mean with a share of 35 percent. Only Veneto with 19 percent has a lower proportion of tertiary educated persons while, on the top, almost half of Ireland's labour force possess tertiary education.

Resilience Jobs in Health Sector



Note Number of employees in the health sector per 100 000 inhabitants in 2019 and the respective development between 2009-2019 p.a.

Source BAK Economics, OECD, National Statistical Offices, OEF

bak-economics.com

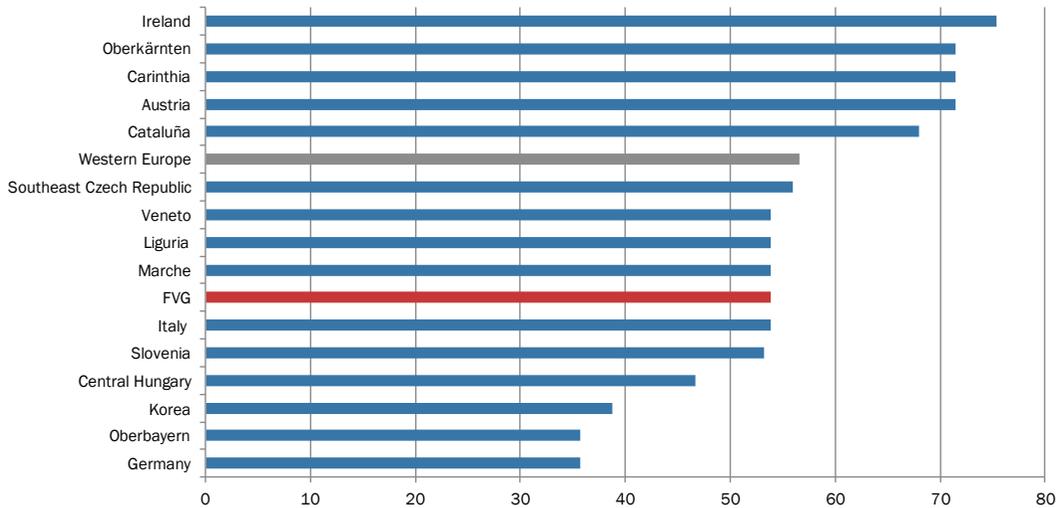
29

Jobs in Health Sector

In this figure, the regions are plotted according to two dimensions. The y-axis indicates the total number of jobs in the health sector per 100 000 inhabitants. By definition, the health sector consists of activities in health care in hospitals and other facilities, residential care that involve health services and social work without accommodation. The values indicated on the x-axis refer to the annual growth of jobs per 100 000 inhabitants in this sector during the last decade from 2009 to 2019.

Although FVG has a lower density of medical personnel than Western Europe, the development in these jobs has outperformed Western Europe and Italy as well. Compared to Italy, the relative number of employees in the health sector is higher in FVG.

Resilience Oxford Economic Support Index



Note Data on national level, 2020 annual average of the Oxford Economic Support Index: 0=no measure, 100=maximal measures

Source BAK Economics, University of Oxford

bak-economics.com

30

Oxford Economic Support Index

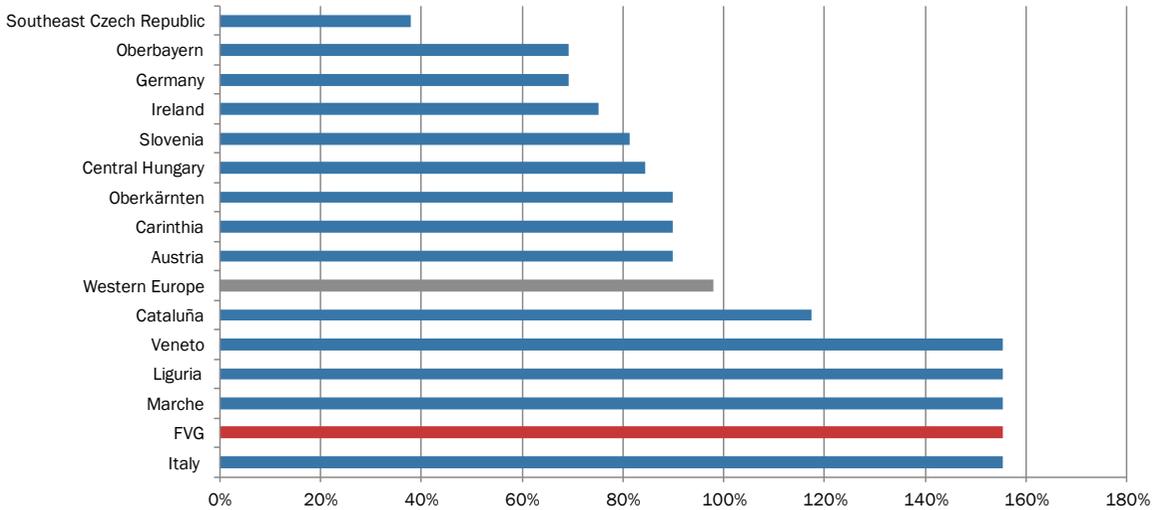
The Economic Support Index is provided by the University of Oxford. The index covers a range of measures from governments that are supposed to mitigate the economic consequences of the response measures to the Corona virus. The index consists of the following variables:

- income support: government provides direct cash payments to people who lose their job or cannot work
- debt/contract relief: government freezes financial obligations for households (e.g., loan payments)
- fiscal measures: anti-cyclical fiscal stimulus announced
- international support: offered aid to other countries related to COVID-19

The mean is calculated over the whole year 2020 on a national level. The Economic Support Index ranges from 0, which represents no fiscal policy, to 100, which would imply a maximum of possible support measures.

Italy's government supported its economy with various instruments. These fiscal activities are slightly less salient than in an average Western European country.

Resilience
Public Debt



Note State public debt as percentage of GDP, 2019, available on national level, no data available for Korea

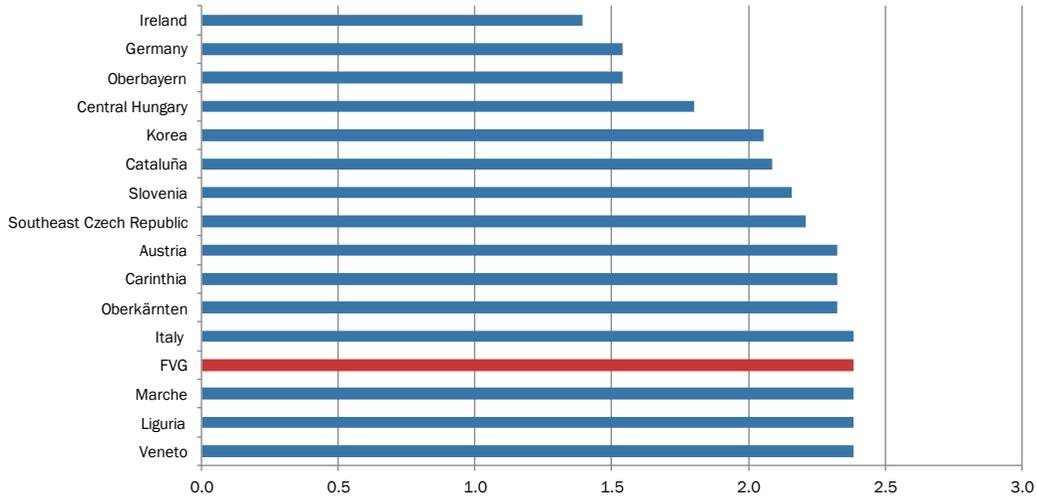
Source BAK Economics, OECD

Public Debt

By the OECD definition, public debt is calculated as the sum of the following liability categories (as applicable): currency and deposits; debt securities, loans; insurance, pensions and standardised guarantee schemes, and other accounts payable. Afterwards, the governmental debt is set in relation to the Gross Domestic Product (GDP). The debt ratio is seen as an indicator of a government’s capacities to execute a counter-cyclical fiscal policy. Therefore, a high degree of public debt implies a considerable limitation to economic support. Consequently, the resilience to economic shocks is weakened.

Since the data is collected at national level, Friuli-Venezia Giulia respectively Italy has the highest degree of indebtedness with 155 percent of the GDP in the peer group. The Western European average is slightly below parity of debt and GDP, Germany is at a rate of around 70 percent. Czech Republic is ranked top with 38 percent.

Resilience
Labour Market Regulation



Note Index (0 = very liberal / 6 = very restrictive), 2017, data is available on national level

Source BAK Economics, OECD, Cato Institute

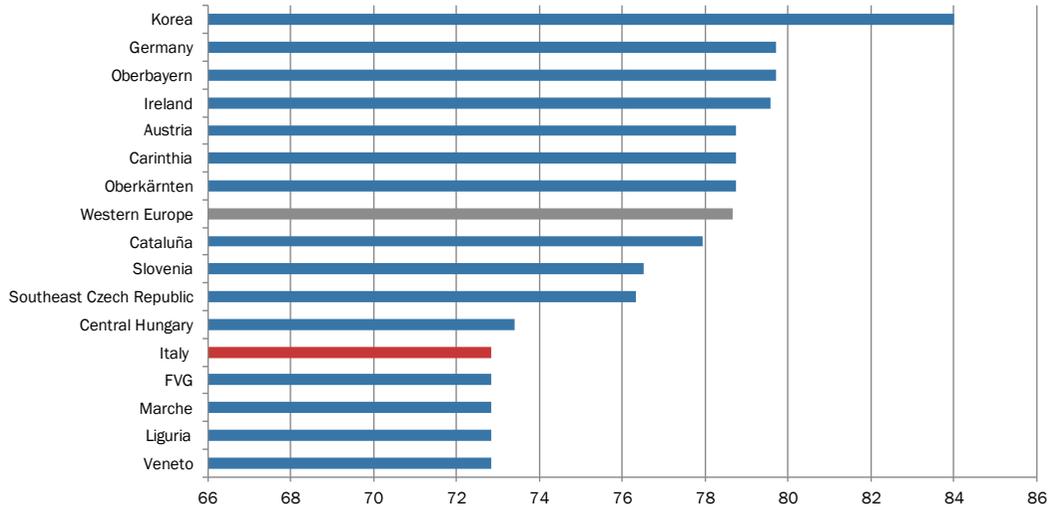
Labour Market Regulation

Regulations correct market failures and compensate for externalities. But regulation is also costly. The optimal level of regulation can not be determined theoretically; empirical studies may help to answer this question, at least partly. Regulations operate through many channels of an economic system and the relationship between regulation and growth is complex. Still, concerning the economic resilience towards an external shock, a highly regulated labour market may hamper adaptability. This is because the economy lacks flexibility when businesses cannot adjust their production cost according to the diminishing demand.

The labour market regulation index refers to the strictness of employment protection of regular contracts as well as temporary employment. The indicator is based on legal information that is coded and transformed. The higher the value, the stronger the regulation. Both indices range from 0 (no regulation) to 6 (restrictive regulation).

The data is provided on national level. Hence, Friuli-Venezia Giulia represents the Italian score. As shown in the graph, Italy has the most strictly regulated labour market in the peer group. Nevertheless, only three of the nine represented countries have a significantly more liberal labour market with index scores below two. Ireland has the most flexible labour market.

Resilience Doing Business Index



Note Index from 0 (impractical for doing business) to 100 (high ease for business), data is available on national level, 2019

Source BAK Economics, Worldbank

bak-economics.com

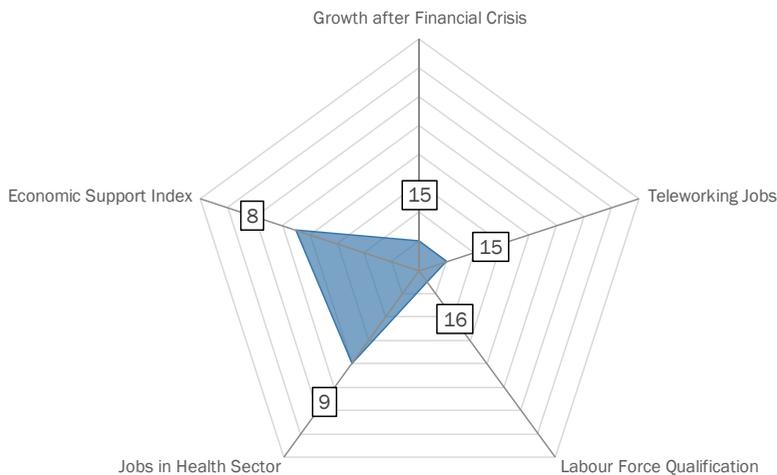
33

Doing Business Index

The Index ranks economies according to their ease of doing business. The data is provided on national level (Territorial Level 0 or NUTS 0). A high ease of doing business means the regulatory environment is more conducive to the starting and operation of a local firm. The rankings are determined by sorting the aggregate distance to the frontier scores on 10 topics: Starting a business, Dealing with construction permits, Getting electricity, Registering property, Getting credit, Protecting minority investors, Paying taxes, Trading across borders, Enforcing contracts and Resolving insolvency. In the recent context of the pandemic, the ease of doing business is a key element in regional resilience.

Since the previously mentioned determinants of the index do not vary excessively within a country, it can be assumed that the regional ease of doing business is about to be equal to the national average. Hence, Catalonia represents the Spanish, Central Hungary the Hungarian and Southeast Czech Republic its respective national score. Friuli-Venezia Giulia, just as the other Italian regions, is indexed at 73 points. This score is below the other peer countries and Western Europe's average. On the other side of the distribution, Korea is ranked 11 index points above Italy.

Resilience Summary – Resilience



Note 17 = last rank respectively lowest resilience, 1 = top rank respectively highest resilience

Source BAK Economics, OECD, National Statistical Offices, OEF, University of Oxford, Cato Institute

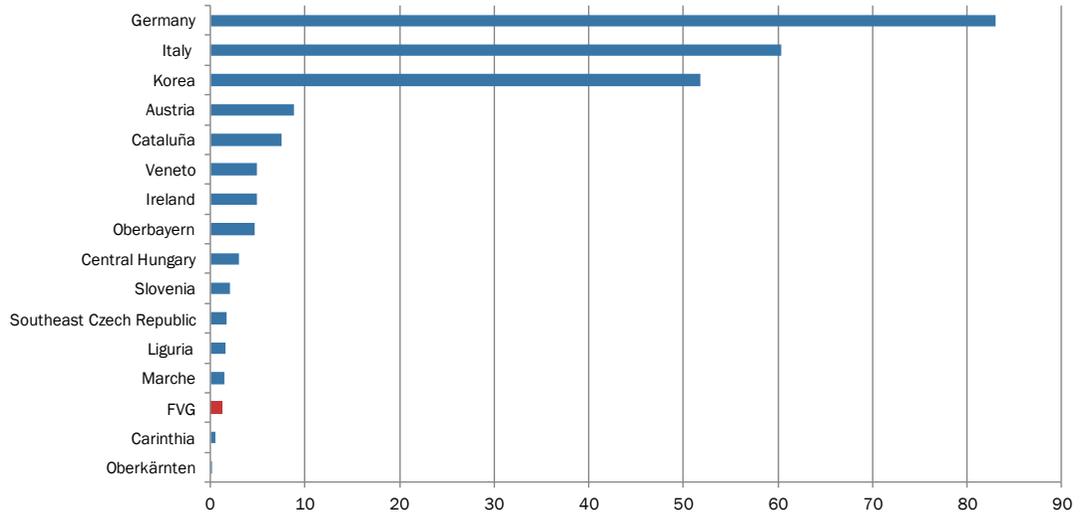
Summary – Resilience

The graph summarizes the rankings of the peer group shown before in the bar charts of selected resilience indicator. Hereby, a high resilience in a certain indicator leads to a top ranking whereas a low ranking results from low resilience. Because of the selected 17 benchmarking regions, the ranking ranges from the 17th to the 1st place.

As the graph indicates, Friuli-Venezia Giulia has in general a lower level of resilience compared to the benchmarking sample. The region is among the last ranks in labour force qualification, share of jobs that are amenable to teleworking and its economic recovery after the financial crisis. Better is the situation in the health sector where the region is ranked around the median. The classification in the economic support index should be interpreted with caution in this illustration. Since only national values are available for this indicator, all of the Italian benchmarking regions are ranked equally. Thus, there are only Hungary, Korea and Germany with a lower score than the Italian regions. Taking this evaluation into account, Friuli-Venezia Giulia seems to have potential to strengthen its resilience to absorb economic shocks and recover faster.

The benchmarking sample consists of all the analysed regions. Further, if no data is available, the according regions received an unweighted average of the group or, where possible, the value from a higher territory unit. For example, Carinthia's score is assigned to Oberkärnten if the indicator is not provided for the according subregion.

Benchmarking Sample Population



Note in Million persons, 2019, Western Europe is not depicted in the graph due to large size

Source BAK Economics

bak-economics.com

35

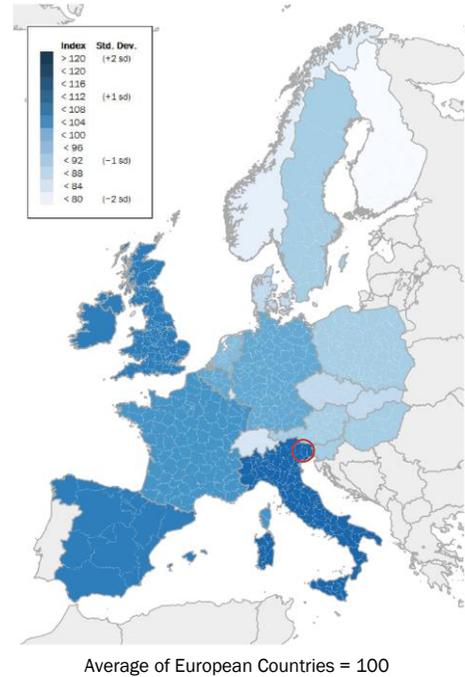
Population

Population by region is defined by the number of inhabitants (citizens or foreigners) living in the defined regions. Data refer to the beginning of the year, except for Korea (year average)

Oxford Stringency Index

High index values refer to strict response measures to the pandemic, data available on national level

Friuli-Venezia Giulia: 113



Note Gov. Response Stringency Index, 2020 annual average
Source BAK Economics, University of Oxford

bak-economics.com

36

Oxford Stringency Index

The Stringency Index is provided by the University of Oxford. The index covers a range of measures from governments that are supposed to avoid an uncontrolled spread of the Corona virus. Following variables affects the score: school & workplace closing, cancellation of public events, restrictions on gatherings, closure of public transport, stay-at-home requirements, restrictions on internal movement and international travel controls.

We calculated the mean over the whole period from the outbreak of COVID-19 in Europe on a national level. The average of European countries is set to 100. The standard deviation of the variable of the same set is set to 10. Consequently, values above 100 indicate more rigorous governmental policies to contain the pandemic and vice versa.

Friuli-Venezia Giulia has a score of 113 which implies more stringent measures than Europe's average.

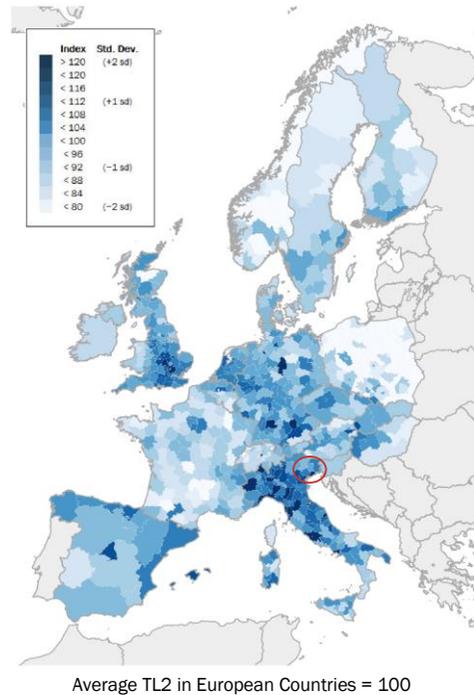
BAK Index of Economic Impact

High index values refer to strong downward corrections of economic forecasts for the regional structure whereas low values imply modest changes

Friuli-Venezia Giulia: 110
Pordenone: 102
Udine: 111
Gorizia: 107
Trieste: 118

Note Change of forecasts 2019 to 2020 weighted with the structure of the respective regional economy

Source BAK Economics, Oxford Economics



bak-economics.com

37

BAK Index of Economic Impact

To take the economic impact of the Corona pandemic into account, we compare the forecasts for Western Europe from 2019 before the spread of COVID-19 to the updated forecasts from November 2020. These reduction of these forecasts are applied on the regional economic structure. The reduction in growth expectations were particularly high in sectors such as tourism, transport and storage, manufacturing (particularly of vehicles), aerospace and other services, whereas the pharmaceutical industry benefited.

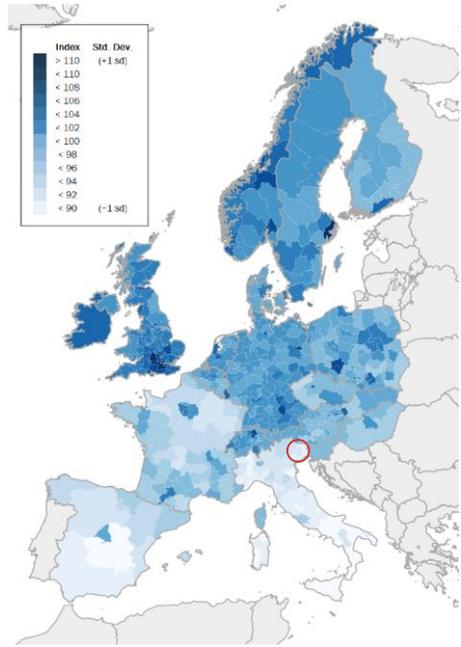
The average of TL2 in European countries is set to 100. The standard deviation of the variable of the same set is set to 10. An index value = 110 means the region is more negatively impacted by the COVID 19 pandemic.

As reflected by the 110 index points, the pandemic caused a negative economic impact in FVG which is one standard deviation above the European mean.

BAK Resilience Index

Resilience index with high values indicating a strong resilience towards shocks as the Corona pandemic

- Friuli-Venezia Giulia: 92
- Pordenone: 92
- Udine: 91
- Gorizia: 92
- Trieste: 95



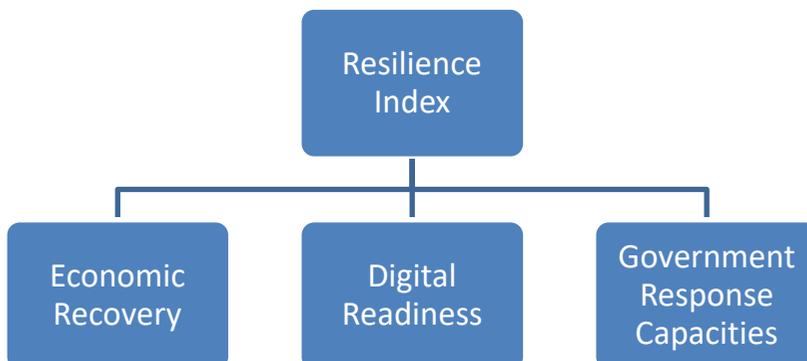
Note Resilience Index, 2020
 Source BAK Economics

Average of European Countries = 100

BAK Resilience Index

The Resilience Index summarizes the most important of the previously shown indicators. The three parts – Economic Recovery, Digital Readiness and Government Response Capacities – are integrated, each one of them with an equal weight of one-third. The first part, Economic Recovery, consists of the indicators that refer to the development of gross value added and unemployment between 2007 and 2015. The Digital Transformation is subdivided into the indicators on broadband access, jobs amenable to teleworking, jobs in the ICT sector and labour force with a tertiary education. The third part includes following indicators: jobs in the health sector, public debt, regulation of labour market, doing business index and economic support index. Finally, the score of the resilience index is calculated by setting the average of the European countries to 100. The standard deviation is set to 10. Values above 100 indicate a high crisis resilience and are considered positive while low scores imply a weak resilience towards shocks.

FVG has a score of 92 and is, therefore, below the European average.



Benchmarking Sample

Definition of Benchmarking Regions

Region	Country	Type	Description	BAKCode
Austria	AT	OECD	Country	AT
Carinthia	AT	OECD	Bundesländer	AT21x
Oberkärnten	AT	OECD	Bezirk	AT21x2xx
Slovenia	SI	OECD	Country	SI
Germany	DE	OECD	Country	DE
Oberbayern	DE	BAK	BAK aggregate	DExAxRBO
Southeast Czech Republic	CZ	OECD	Oblasti	CZ06x
Central Hungary	HU	OECD	Planning Statistical Regions	HU10x
Cataluña	ES	OECD	Comunidades y ciudades autónomas	ES51x
Ireland	IE	OECD	Country	IE
Italy	IT	OECD	Country	IT
Friuli-Venezia Giulia (FVG)	IT	OECD	Regioni	ITH4x
Marche	IT	OECD	Regioni	ITI3x
Liguria	IT	OECD	Regioni	ITC3x
Veneto	IT	OECD	Regioni	ITH3x
Western Europe	INT	BAK	BAK Aggregate	INTxAxW15
Korea	KR	OECD	Country	KR

COVID-19 Economic Impact Index: Exposure – Indicators and Definitions

Exposure		
Indicator	Definition	Source
COVID-19 Excess Incidence	Excess COVID-19 cases rate per 100k inhabitants (compared to the mean)	ECDC, FOPH, UK Government
Oxford Stringency Index	Gov. measures to contain the spread of the pandemic (school/workplace closing, restriction on movement and gatherings, etc.)	University of Oxford
Mobility Trends	<ul style="list-style-type: none"> - Google mobility trends workplaces - Google mobility trends retail shops and places of recreation 	Google

Source: BAK Economics

COVID-19 Economic Impact Index: Sensitivity – Indicators and Definitions

Sensitivity		
Indicator	Definition	Source
Index of Economic Impact	Difference of economic forecasts between 2019 and November 2020 for 113 sectors multiplied with the employment structure of the respective region	BAK Economics, Oxford Economics
Share of Jobs at Risk from COVID-19 Containment Measures	Measures the proportion of jobs that are involved in travelling, tourism and services which require direct contact to customers.	OECD
Share of Employment in micro-sized Enterprises	Share of the labour force that is employed in a company with less than 10 FTE.	Eurostat, European Commission
Share of Jobs in Tourism Sector	Proportion of the tourism sector in relation to the entire labour market.	OECD, Oxford Economics, National Statistical Offices
Growth Contribution of Tourism Sector	Real gross value added (GVA) growth and share of nominal GVA between 2009-2019 of the tourism sector.	OECD, Oxford Economics, National Statistical Offices
Foreign Residents in Tourist Accommodations	Share of foreign tourists in hotels and other short-stay accommodations	Eurostat

Source: BAK Economics

COVID-19 Economic Impact Index: Resilience – Indicators and Definitions

Resilience		
Indicator	Definition	Source
Economic Growth after Financial Crisis (2007-15)	Growth rates of Gross Value Added between 2007 and 2015	BAK Economics, OECD
Change in Unemployment (2007-15)	Change in the unemployment rate between 2007 and 2015	BAK Economics, OECD
Diffusion of Broadband Access	Percentage of households with broadband access	Eurostat
Share of Jobs amenable to Teleworking	Proportion of jobs that could be continued from home	OECD
Share of Jobs in ICT Sector	Size of the ICT sector	OECD, Oxford Economics, National Statistical Offices
Qualification of Labour Force	Share of labour force with tertiary education	OECD
Jobs in Health Sector	Number of employees in health sector per 100 000 inhabitants and its development between 2009-2019	OECD, Oxford Economics, National Statistical Offices
Public Debt	Government debt relative to the Gross Domestic Product	OECD
Labour Market Regulation	Labor Market Regulation Index (0=best, 6=restrictive)	OECD, Cato Institute
Doing Business Index	Easiness of Doing Business (0=worst, 100= best)	Worldbank
Oxford Economic Support Index	Gov. measures to ameliorate financial losses due to pandemic restrictions.	University of Oxford

Source: BAK Economics AG