centre for progressive policy

Back from the brink: avoiding a lost generation

Technical Appendix

May 2020

This technical appendix describes the assumptions and methodology used to obtain the numbers reported in *Back from the brink: avoiding a lost generation.* In particular, it covers:

- The model assumptions and methodology behind the GVA and earnings scenario for different local authorities
- The assumptions used to categorise local authorities as 'Red Wall' and 'Towns Fund'.

The report and appendix are accompanied by a dataset which lists the local authorities covered, their moderate/resilient/vulnerable category, and whether they are a Red Wall or Towns Fund authority. We are not publishing local authority specific GVA scenarios.

Model assumptions

The report presents a scenario of the divergent paths local economies might take following the coronavirus crisis. This section sets out the method and assumptions used, and the rationale behind this.

The scenario is constructed at the local authority level. However individual authority numbers are not presented to avoid giving an undue impression of certainty. Instead, they are grouped to give an understanding of the range of effects that may be felt by different types of places.

Purpose and timeline

The model aims to look at the scarring effects of the crisis, and how these will diverge between different places.

We model the scale of the ongoing scarring at a national level based on an assumption that it will be commensurate with previous recessions. Therefore, the key assumption is not the level of recession during lockdown, but how much of that 'sticks' into the year following this.

We therefore use a simplified timeline centred around this 'Year 1' following the lockdown. This can be thought of as 2021. Year 0 is included for completeness but is not the focus of the model and subsequent years are not, at a national level, dependent on it. (The differences between places in the lockdown do impact future years.)

Table 1: Model timeline description

Model Year	Model name	Notes
-1	Pre-crisis	2019. This is the baseline relative to which we measure effects of the crisis
0	Lockdown	2020. The year in which lockdown occurs. The size of the recession in this year is not the focus of the model but is included to show a continuous timeline.
1	Recession	2021. This is the crucial year of the model. It is supposed to represent the year after lockdown measures have been lifted but the economy is impacted by its legacy, though in reality, there will not be a clean end to the lockdown, and it may occur slightly earlier than 2021. n.b. The year will not technically be a recession as GDP will grow from very low lockdown levels. We have named it such because it will bear the features of a typical recession with a large output gap.
2	Recovery	2022 to 2025. The years in which the economy stabilises with permanently lost output levels but, in vulnerable places the economy continues to deteriorate.
3		
4		
5		

Geography

The model covers 382 local authorities across the four countries of the UK at the local authority district and unitary authority level.

The lockdown effect (and Year 0)

The model is dependent on the different level of impact the lockdown has on the GVA of different places. These

are reported in the 'Initial Impact' section of the report. They are calculated by multiplying the OBR's forecast of the sectoral fall in GDP[1] and the sectoral composition of each local authority. The sectoral breakdowns are from ONS data for 2018.[2] We matched the sectors used in the ONS data to the OBR assumptions as described in the following table.

Table 2: Sectors Q2 2020 lockdown effect assumptions

OBR sector definitions		Local authority data sector definitions):
Sector	**Assumed Q2 GVA impact (%)**	**Sector**
Agriculture	0	Agriculture, mining, electricity, gas, water and waste
Mining, energy and water supply	-20	
Manufacturing	-55	Manufacturing
Construction	-70	Construction
Wholesale, retail and motor trades	-50	Wholesale and retail trade; repair of motor vehicles
Transport and storage	-35	Transportation and storage
Accommodation and food services	-85	Accommodation and food service activities
Information and communication	-45	Information and communication
Financial and insurance services	-5	Financial and insurance activities
Real estate	-20	Real estate activities
Professional, scientific and technical activities	-40	Professional, scientific and technical activities
Administrative and support activities	-40	Administrative and support service activities
Public administration and defence	-20	Public administration and defence
Education	-90	Education
Human health and social activities	50	Human health and social work activities
Other services	-60	Other service activities
		Arts, entertainment and recreation
		Activities of households

* Agriculture and mining figure based on UK GVA weighted average of two sectors

The Q2 'initial impact' figures for each local authority are translated into forecasts for Year 0 (2020) by scaling them by a factor of 0.45 so that the national impact is 16%.

16% is chosen to reflect the fact that there was limited impact in Q1, and lockdown effects are likely to be more limited in Q3 and Q4. However, **it is for illustrative purposes only and the focus of the model, the ongoing scarring effects, are not dependent on it**.

The differences between places in lockdown does impact our ongoing GVA scenario (see *Difference between places*).

The national trajectory

We assume, nationally, an 8% permanent output loss, i.e. that GVA is 8% lower in Year 1 (2021) than would be expected based on the pre-crisis trend, and that it stays 8% lower than trend in each subsequent year. If you take the pre-crisis trend to be 2%, this would mean that Year 1 GVA is 4% lower than 2019 in absolute terms, and that GVA returns to 2019 level in 2023.

The assumption is based on the premise that this unprecedented economic shock will lead to the sort of permanent output loss seen in previous recessions. There is significant uncertainty around the GDP impact but, we believe, it is justified to model a more prolonged impact than others are forecasting. As shown in the table below, in none of the four recent recessions did national output return to within 5% of the pre-trend projection by the fifth year.

Table 3: Indexed GDP relative to projected 10-year trend[3]

Year		1974	1980	1990	2008	Average
Pre-crisis	-1	100	100	100	100	100
Crisis	0	94	95	98	97	96
Recession	1	89	92	95	90	92
Recovery	2	89	92	93	89	91
	3	88	93	92	88	90
	4	88	93	93	87	90
	5	88	94	93	86	90
10-year pre-crisis trend growth used for projection		3.6%	2.6%	2.6%	3.0%	

N.b. Analysis is based on calendar year GDP. Starting at the first quarter of the recession would give an earlier nadir.

As in our model, the lowest output levels of the crises have been in the second calendar year. The average of the four is the basis of our 8% assumption. Whilst previous evidence suggests that output might continue to slightly decline after the second year of the recession (relative to trend), we assume it stabilises. This is for simplicity given the level of uncertainty involved. See the central projection of Figure 1.

Differences between places

The main purpose of the model is to illustrate the different impact that the crisis will have on different places. The

[1] OBR (2020) *Commentary on the OBR Coronavirus reference scenario.* Available at: https://cdn.obr.uk/Coronavirus_reference_scenario_commentary.pdf
[2] ONS (2019) *Regional gross value added (balanced) by industry: local authorities by NUTS1 region*. Chained volume measure (2016 prices) data used. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgrossvalueaddedbalancedlocalauthoritiesbynuts1region
[3] CPP calculations based on ONS data: ONS (2020) Data series Gross Domestic Product: chained volume measures: Seasonally adjusted £m (ABMI; Feb 2020 release). Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/pn2

difference of places to the national trajectory are influenced by two factors:

- The size of the initial lockdown effect
- The trajectory of the recovery, which we model by:
    - Assuming trajectories for resilient, moderate, and vulnerable local authorities
    - Assigning each local authority to one of these categories

Size of initial lockdown

The **size of the initial lockdown** effect is carried through using the formula:

$$\frac{\%\ GVA\ lost_{LA}^{Recovery}}{\%\ GVA\ lost_{National}^{Recovery}} = \left(\frac{\%\ GVA\ lost_{LA}^{Lockdown}}{\%\ GVA\ lost_{National}^{Lockdown}}\right)^{0.5}$$

Effectively, we assume that half the differences in lockdown are carried through. This assumption reflects the fact that we believe that an area's recession will partly be determined by local effects dependent on the scale of the lockdown, but partly by national effects which closer resemble a normal recession (e.g. confidence, investment etc.)

The scale of the lockdown is also counted in the chance an area has a prolonged recovery. (See 'Assignment to categories' section below.)

The different trajectories of categories

We know from previous recessions that some places' economies will do much better than others. These differences necessitate the place-based responses our policy section recommends.

Whilst we can be confident there will be differences between places, and the rough scale of this, we can be less certain of which places will do well and badly. (See 'Assignment to categories' section below.) The categories and modelled recovery paths are designed to represent our expectation for the places that are likely to do well or badly, so as to provide an indication of the economic risk to places, but not our central forecast for those places named in the category. This is why we do not present results for individual authorities.

We assume the vulnerable do 2 points worse than normal in Year 1, and then a further 1.5 points each subsequent year. The resilient category is the mirror of this.

Table 4: Scenario assumptions

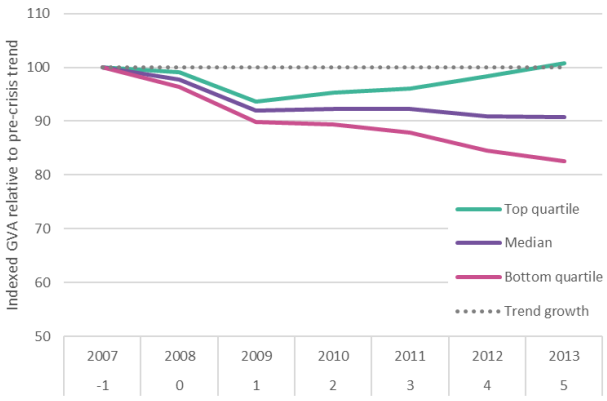
Year		Vulnerable	Resilient
-1	Pre-crisis	n/a	n/a
0	Lockdown	n/a	n/a
1	Recession	98	102
2	Recovery	96.5	103.5
3		95	105
4		93.5	106.5
5		92	108

Combined with the national trajectory assumed above this results in the following trajectories:

Figure 1: Local authority GVA projections by scenario (relative to trend growth)

The assumptions are based **on evidence from previous recessions**. For the 2008 recession we are able to track the different paths, in terms of annual GVA, of the same local authorities we use in model. The worst quarter of local authorities, on average, did 1 to 2 percent points worse a year, with the best quarter showing a similar upside (shown in figure).[4] The worst local authorities' performance was much more extreme. East Hertfordshire was 29 points beneath trend by 2013.

Figure 2: The diverging recovery of different UK local authorities from the 2008 recession



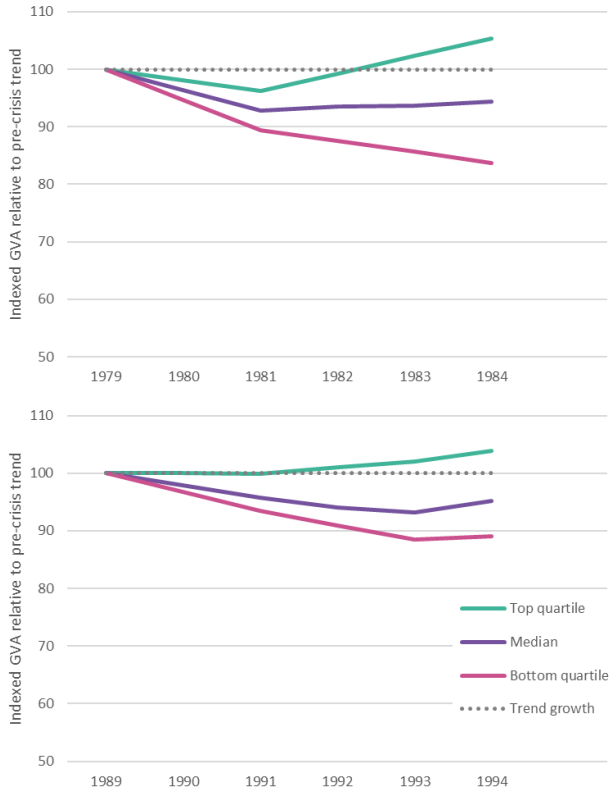
Top/bottom quartile is the mean average of the 25% of LAs that perform best/worst by 2013. Taking the top 25% each year would show larger differences in the earlier years.

[4] We conservatively show the top and bottom quarter of authorities as the modelled resilient and vulnerable groups form slightly less than a quarter of authorities.

Trend assumed at 2% growth p.a.

A similar pattern between local areas was seen in earlier recessions in 1980 and 1990. For this period we only have data for 60 counties, so would statistically expect smaller differences, but the differences for 1980 are slightly larger, at almost 2 percent points a year away from the median, and similar on the downside for 1990 at 1.5% per year, with a larger upside.

Figure 3: The diverging recovery - UK counties for the 1980 and 1990 recessions



n.b. Data for 1980, 1982, 1983, 1990, 1992 and 1994 is interpolated as linear growth between neighbouring years. This is broadly appropriate except for 1992 which should be lower. Trend growth assumed at 3% for 1980 and 2% for 1990.

On balance, our assumptions on the differences between places appear slightly more conservative than the evidence.

Assignment to categories

Each local authority is assigned to one of three categories. An LA is placed in the vulnerable category if it meets at least two of the following four criteria:

Table 5: Vulnerable category criteria

Indicator	Criteria	Implied cut-off level	UK equivalent figure
Year returned to 2007 GVA level	Not by 2013	(26% of LAs)	2012
2019 unemployment	Worst 20% of LAs	> 4.59%	3.9%
Lockdown GVA effect	Worst 20% of LAs	> 41%	36%
Proportion of adults with no skill qualifications	Worst 20% of LAs	> 9.9%	7.9%

See accompanying text for full definitions and sources.

An LA is placed in the resilient category if it meets two of the following four criteria:

Table 6: Resilient category criteria

Indicator	Criteria	Implied cut-off level	UK equivalent figure
Year returned to 2007 GVA level	By 2010	(32% of LAs)	2012
2019 unemployment	Best 20% of LAs	< 2.65%	3.9%
Lockdown GVA effect	Best 20% of LAs	< 33%	36%
Proportion of adults with 4+ skill level	Best 20% of LAs	> 46.7%	40.2%

See accompanying text for full definitions and sources.

Three authorities would qualify for both categories. These are placed in the moderate category, along with any authority that does not meet either set of criteria.

The total numbers in each category are:

- 87 are vulnerable
- 90 are resilient
- 205 are moderate

The levels of the categories were chosen so that between a fifth and a quarter of authorities would be in the vulnerable and resilient categories. This is to reflect the proportion of authorities that experience significantly different outcomes in the previous recessions shown in the earlier figures. The reasons behind the inclusion of each criteria are as follows.

2008 recession recovery

We assume that areas will retain some of the characteristics that meant they were or were not able to recover quickly from the effects of the previous recession.

We define the criteria in terms of the first calendar year in which local authority real GVA is at least the level of 2007.[5]

[5] ONS (2019) op cit.

Lockdown impact

We assume areas with a greater concentration of sectors affected by the lockdown are more likely to suffer a prolonged recession. A concentrated shock is more likely to lead to permanent effects as the demand effect may lead more secondary business failures, and the relative scale will mean the remainder of the economy will have less capacity to absorb workers.

Unemployment

Our own cross-sectional analysis of the recovery of local authorities from the 2008 recession shows that areas going into the crisis with higher unemployment suffered greater increases in unemployment. This relationship stands after controlling for other relevant factors such as sector concentration or skill levels.

We therefore use high and low 2019 unemployment rates to assign authorities to the vulnerable and resilient categories respectively.[6]

Skills

Our analysis also found that areas with a high proportion of people with no skills qualifications had larger GVA reductions and higher unemployment increases resulting from the 2008 recessions. Separately to this, an area having a higher proportion of highly skilled workers tended to lead to a larger initial GVA loss, but then a quicker recover. On this basis we assign areas with high levels of low-skilled residents to the vulnerable category, and those with high levels of high-skilled residents to the resilient category. This is based on 2019 data from the Labour Force Survey.[7]

Earnings effects

We also report a scenario of the earnings impacts of the crisis. These are based on the national and local GVA we model (as described above) using the following assumptions:

- The change in local earnings follows the change in national GVA with an elasticity of 1.0 (when both are measured against trend)
- The change in local earnings follows the difference between national and local earnings with an elasticity of 0.05
- Both effects are applied with a two-year lag.

We model the GVA and earnings effects against the projected trend. To translate these into real earnings changes we assume:

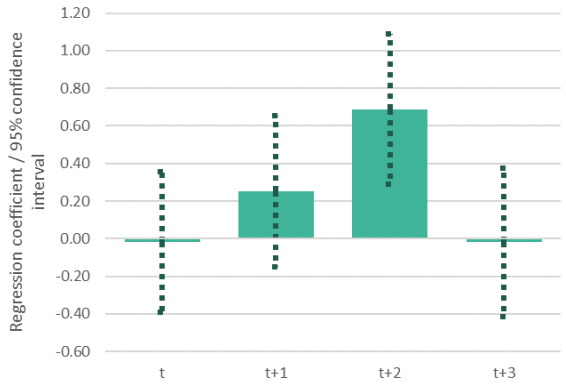
- A trend real earnings growth rate of 1.5% below the GVA growth rate
- Coupled with the 10-year pre-crisis real GDP growth rate, this translates to a trend real growth rate of 0.36% per year

Changes in earnings levels are applied to the base of 2019 median earnings levels across all workers as reported in ASHE. A small number of local authorities' median earnings figures are not reported in 2019. These are not modelled and excluded from any averages reported.

Evidence

Again, our relationships are based on historical evidence. Looking at UK national data since 1998, is a limited dataset, but shows a clear relationship, which is strongest at a two year lag, as shown in the figure below.[8] The intercept of this national regression was used inform the assumption of a real earnings trend of 1.5 points below the GDP trend.

Figure 4: The lagged effects of real GDP change on real median earnings



Based on regression of real earnings annual change against GDP change in the current year and the previous three years, and real earnings change in the previous year. The coefficient on the latter, not shown, was 0.14. Data is for 2001 to 2019.

The local relationship assumptions are based on a regression of local authority year on year earnings changes against national GDP changes and its lags, and the difference of local to national year on year GVA changes and its lags. This showed a similar relationship to national GDP as in the figure above, with a partial one-year lag, stronger two-year lag, and cumulative coefficient of around 1.

The relationship with local GVA was much weaker, with a 1% change in GVA (relative to national levels) translating through to a 0.04% change in earnings. At a local level, the lag was just one year. We apply the same lag as the national level for simplicity.

[6] Data used is modelled unemployment rate for Oct 2018 to Sep 2019 from ONS' January 2020 release. Norther Irish authorities use 2018 data from NISRA uplifted in line with the Norther Irish total for the respective periods.
ONS (2020) *M01 Regional labour market: Modelled unemployment for local and unitary authorities*. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/datasets/modelledunemploymentforlocalandunitaryauthoritiesm01/current
NISRA (2019) *2018 – District Council Labour Market Structure* https://www.nisra.gov.uk/publications/labour-force-survey-tables-local-government-districts-2009-2018
[7] Extracted from Nomis.
[8] Earnings data is extracted from Nomis based on ASHE. We use median pay measure for total (full-time and part-time) jobs, workplace geography. We only use local authorities with a complete dataset across the time period. GVA data is chained volume measure: ONS (2019) op cit.

Interpretation

The current crisis is likely to lead to short-term earnings impacts as, for example, furloughed employees are on 80% pay. Our modelling does not capture these effects and so is only used to look at the longer-term earnings impacts of the crisis.

The modelled relationship between local GVA and earnings is lower than might be expected. This may be due to GVA changes being dominated by movements in labour volume between authorities, or changes in the returns to non-labour factors of production. However, the small samples of local earnings data and complex time-series relationships means caution should be used in interpreting the data.

Other assumptions

The report refers to the effects of the crisis in 'Red Wall' and 'Towns Fund' areas. In line with our modelling, we define these areas in terms of local authorities. The full lists are in the accompanying dataset, having been defined as follows.

Towns Fund

A Towns Fund local authority contains at least one of the 100 towns invited to develop proposals for a Town Deal.[9]

Red Wall

A Red Wall local authority contains the majority (by population) of at least one Red Wall parliamentary constituency.[10]

A Red Wall parliamentary constituency that switched from Labour to Conservative in 2019 election and is in the North of England or Midlands (i.e. government office regions: East Midlands, West Midlands, Yorkshire and Humber, North East, and North West).[11]

[9] MHCLG (2019) *100 places to benefit from new Towns Fund*. Available at: https://www.gov.uk/government/news/100-places-to-benefit-from-new-towns-fund

[10] Based on CPP cross-matching of wards and their 2018 populations to constituencies and local authorities. Ward lookups from ONS and available at: http://geoportal.statistics.gov.uk/datasets/ward-to-westminster-parliamentary-constituency-to-local-authority-district-to-upper-tier-local-authority-december-2019-lookup-in-the-united-kingdom. Ward populations also from ONS available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/wardlevelmidyearpopulationestimatesexperimental

[11] CPP analysis based on data from: House of Commons Library (2019) *Constituency data: election results*. Available at: https://commonslibrary.parliament.uk/parliament-and-elections/elections-elections/constituency-data-election-results/