**TRUSSELL TRUST IMPACTS OF CORONAVIRUS:**

## PROJECT NOTE 2

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*Project reference c97_1/PN*

version 3, 28 August 2020

# POTENTIAL EMPLOYMENT IMPACT OF CORONAVIRUS

## 1 INTRODUCTION

### 1.1 Background

*1.1.01*  This note reports DSC's contribution to the HWU project for Trussell Trust to consider the likely impact of coronavirus, and measures to restrict the spread of the virus, on the need for foodbanks in Britain. The note was an input to Task 2 of the project – considering the inter-sectoral linkages and how they will affect the way in which the direct economic effects of coronavirus and related measures will extend to other parts of the economy.

*1.1.02*  The work described in sections 1 and 2 of the note was carried out and written up in April-May 2020; that in section 3 was done and report in June-July 2020. The April-May results have been retained here as a record of what was input to the earlier stages of the project.

### 1.2 Scope

*1.2.01*  Task 2 is trying to estimate the downturn in the economy due to the Covid19 pandemic itself and to precautions aimed to limiting the spread/intensity of the pandemic. It has to take account of indirect and induced effects once these have worked through the linkages in the economy, and from this to estimate the potential impact on employment by sector, and if possible by region and occupation.

*1.2.02*  It should be emphasised that we are concerned with forecasts of how serious the impact may be now or in the near future. If possible we should consider how long the crisis in employment and earnings will last, though this is highly complicated by the uncertainties about the future of the pandemic, the risk of further periods of lockdown being required, and so on. We are not particularly concerned  with estimating the overall impact on GDP for the calendar or financial year, though that is potentially implicit in what we are doing, and if possible we should as a check consider whether the sum of our very-short-term impacts is compatible with comparable impacts of annual effects.

### 1.3    Requirements

*1.3.01*    This Task ideally requires as input estimates of four conceptually distinct effects (by sector).

*1.3.02*    **Effect I**: **Shutdowns**: the numbers of UK workers who cannot work, or the volume of production that they cannot produce,

- because they work in sectors/establishments that have been closed down by government order (after allowing for any changes in function e.g. restaurants trying to operate as take-aways);

- because the work is not compatible with remote working or social distancing and the management of a firm or unit (perhaps just one part of a factory) has therefore suspended work;

- because the workers themselves are not working either because they have (or appear to have) Covid19, or are in quarantine or self-isolation and cannot work remotely;

- because other critical workers are on sick leave, in quarantine or in self-isolation (and cannot work remotely or be replaced by others) and hence essential inputs are not available.

*1.3.03*    **Effect II: Changes in Demand**: the loss of demand for UK domestic products/services due to

- changes in household consumption (e.g. spending on substitutes for products/services that are clearly not available [potentially positive for some sectors], or spending less) before considering changes due to changes in income (i.e. induced effects);

- changes in government consumption of products and services (including additional NHS spending);

- changes in export demand (e.g. effects of reduced economic activity in China);

- changes in investment expenditure (e.g. reduced reinvestment by businesses because of the prevailing uncertainties).

*1.3.04*    **Effect III: increases in employment** due to firms operating in different ways (e.g. increased employment of delivery drivers, care home staff) to meet the same demands.  (This should be distinguished from increases in employment to meet increased demands, which are included in (II) above.)

*1.3.05*    **Effect IV: external supply shortages** i.e. UK production that is blocked by shortage of imported inputs.

*1.3.06*    Ideally, Task 1 should address the question of whether any production that is directly blocked by lack of imports is also blocked by UK shutdown measures. It should also consider how the consequences of changes in demand will interact with the limitations due to shutdowns e.g. it should not double-count the reductions in consumer expenditure in pubs and restaurants due to the shutdown of the latter.

*1.3.07*    The task T2 is then to calculate the overall negative impact, in terms of employment, as

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- the direct and indirect effects of changes in final demand i.e. of category II;

- plus the indirect effects arising from suppressed production (category I) including the potential effects of supply shortages (category IV);

- plus the potential for induced effects from overall reductions in household income resulting from the above,

- less the gains in additional employment (category III).,

avoiding double-counting i.e. not counting reductions in employment resulting from decreased demand for sectors which are already closed by government order. NB "employment" here should include self-employment, though ultimately (in subsequent Tasks) self-employment needs to be distinguished because of the different implications for social security etc.

1.3.08 This should give three estimates of the reduction in economic activity and employment, arising from

(a) suppressed production (the direct effect of (I));

(b) the above plus the direct impacts of changes in final demand, and the indirect consequences of both and of supply constraints once all demand and supply effects have worked through the economy, but assuming households still have the same total incomes available;

(c) all the above plus induced effects i.e. once the full effects of affected incomes have worked through as well.

1.3.09 Output (a) will give us estimates of the numbers of workers at risk of unemployment from the direct effects of Covid19 and the restrictions that have been put in place by government. Output (b) will give us estimates of the numbers at risk from those effects and restrictions and from the other changes in demand before income effects. Output (c) will represent a worst-case set of economic consequences.

1.3.10 The present position, some weeks into the crisis, if we could measure it accurately in terms of production, would represent something more than level (a) but probably less than (b) and certainly less than (c), because of timelags in supply chains (firms producing using supplies in stock, firms producing to meet pre-crisis orders) and because firms and government are at least delaying some of the impacts on earnings. Consumer service sectors and those producing or dependent on short-life products that cannot be stockpiled will be further towards point (b) than other sectors.

1.3.11 How far and how quickly the economy moves towards point (c), where the full effect of reduced production affects household incomes, will depend on firms' and government responses. That will be for Task T3 - to work out how much of the potential losses of employment and income will be avoided, over different timescales, by firms retaining employees on regular or reduced pay or by furloughing employees rather than dismissing them. The greater the proportion of employees' wages and self-employed persons' profits that

continues to be paid either by firms themselves or by government schemes, the closer to level (b) the economy will remain[1].

# 2    MODELLING PROCESS

## 2.1    Step 1: define direct impacts (inputs to Task 2)

*2.1.01*    The input received from IPPR considers the core T1 effect of the degree to which work in each sector can continue under current UK restrictions, but also considers demand effects (T2) and the financial ability of employers to survive the crisis (T3). The IPPR classification is reproduced in Table 2-1; only the effects in bold were really needed from T1. (This is not a criticism of IPPR.)

**Table 2-1 Basis of IPPR classification**

Source: attachment to IPPR email to Professor Bramley, date 09 April 2020 [i]

| Risk level | Characteristics/factors Considered |
|---|---|
| Lower Risk | Covid-19 restrictions unlikely to affect demand for goods/services |
| | **Feasible to work from home or work compatible with social distancing** |
| | Public sector employer or otherwise less likely to go bankrupt |
| | **Sector employs "key workers"** and additional demand likely through the crisis |
| Higher Risk | Covid-19 restrictions likely to affect demand negatively |
| | **Impossible to work from home and work incompatible with social distancing** |
| | **Sector not critical to Covid-19 response** |
| | Private sector employers, and insolvency risk |

*2.1.03*    We have revised the IPPR analysis to reassess the risk due strictly to the T1 effects defined in our section 1.3 above. This means we are taking out of their analysis the risks of reduced demand or employer insolvency, but also the possibility of additional demand; our revisions therefore tend to reduce the risk of negative impacts but also to reduce the possibility of positive impacts[2]. The results of our adjustment, applied to the IPPR base figures, are shown in Table 2-2 below.

**Table 2-2 Assessment of direct impacts**
Source: Own modification of IPPR table[ii]

| Sector (SIC) | Base employment | Risk | Risk effect | Reduction in jobs |
|---|---|---|---|---|
| A : Agriculture, forestry and fishing | 488,750 | None | 0% | 0 |
| B : Mining and quarrying | 49,450 | None | 0% | 0 |
| C : Manufacturing | 2,433,000 | Low/Medium | 19% | 462,270 |

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[1]    The Gourinchas paper cited by IPPR also makes the important point that measures to ensure continuity of earnings – especially for those on low incomes with limited or no savings or other resources – will make "stay at home" policies to slow the spread of coronavirus more effective by reducing the need for people to take other jobs in order to survive.

[2] IPPR's assessment doesn't mention the risk of negative impacts due to non-labour supply problems, though those are prominent in the OECD analysis they quote.

| Sector (SIC) | Base employment | Risk | Risk effect | Reduction in jobs |
|---|---|---|---|---|
| D : Electricity, gas, steam and air conditioning supply | 141,000 | None | 0% | 0 |
| E : Water supply; sewerage, waste management and remediation activities | 214,000 | Low | 8% | 16,050 |
| F : Construction | 1,494,000 | Medium | 38% | 567,720 |
| G : Wholesale and retail trade; repair of motor vehicles and motorcycles | 4,661,000 | Medium/high | 45% | 2,097,450 |
| H : Transportation and storage | 1,456,000 | Medium | 38% | 553,280 |
| I : Accommodation and food service activities | 2,319,000 | High | 75% | 1,739,250 |
| J : Information and communication | 1,273,000 | Low | 8% | 95475 |
| K : Financial and insurance activities | 1,029,000 | Low/Medium | 19% | 195,510 |
| L : Real estate activities | 579,000 | Medium/high | 45% | 260,550 |
| M : Professional, scientific and technical activities | 2,685,000 | Low/Medium | 19% | 510,150 |
| N : Administrative and support service activities | 2,724,000 | Low/Medium | 19% | 517,560 |
| O : Public administration and defence; compulsory social security | 1,276,000 | Low | 8% | 95,700 |
| P : Education | 2,626,000 | Low | 8% | 196,950 |
| Q : Human health and social work activities | 3,960,000 | Low | 8% | 297,000 |
| R : Arts, entertainment and recreation | 761,000 | High | 75% | 570,750 |
| S : Other service activities | 636,000 | Medium | 38% | 241,680 |
| **Total** | **30,805,200** | | **27.3%** | **8,417,345** |

*2.1.04* This gives a direct impact of approximately 8.4 million jobs, compared with IPPR's middle estimate (inclusive of the indirect effects, i.e. all the effects defined in Table 2-1) of 12.6 million jobs. This is about 27% of total jobs, and comparable with the equivalent OECD estimate of initial impacts on GDP.

*2.1.05* It must be kept in mind that the 8.4 million jobs figure is a measure of "work not being done" and hence of the **potential** job losses, not immediate job losses. Actual job losses will be delayed by physical buffers in the system (e.g. firms dependent on imported inputs may have stocks of those inputs in hand, in industries where just-in-time delivery is not the norm), by the time taken for firms to respond, and by firms choosing to retain staff whether at their own expense or with support from the government furlough scheme.

## 2.2    Step 1: define Task 2 modelling process

*2.2.01* We are taking the reductions in jobs shown in Table 2-2 as representing the sum of

- work not being done because of shutdowns;

- work not being done because of shortages of imported inputs;

- changes in the mix of final demand (including consumers spending less or purchasing different goods/services because of the restrictions, but excluding the effects of changes in incomes);

- changes in work done due to changing working practices;

before considering

- indirect effects

- induced effects.

2.2.02  We now need to consider first indirect effects, then induced effects, but trying to identify and to exclude any areas where a negative indirect or induced effect coincides with work not being done because of shutdown or shortage of imports. (So - for example - if a wholesaler distributing clothing imported from China and Italy has stopped work because those imports are not arriving (because the Chinese and Italian factories are shut), there will not be any additional effect arising because the shops that would have sold such clothing on to consumers have themselves closed and are not purchasing stock from the wholesalers.)

2.2.03  There is also the question of offsetting positive effects i.e. additional jobs being created specifically to meet needs arising from the coronavirus emergency.

2.2.04  The sequence adopted is

- run the pre-existing input-output model to estimate the joint impact of direct and indirect effects;

- adjust for induced effects both negative (loss of income) and positive (additional income from new jobs and longer hours);

- adjust for double-counting;

- at each step reviewing against any emerging data and thinking about the temporal pattern of impacts.

## 2.3  Step 3: estimate indirect effects of direct impacts

*The model used*

2.3.01  The model is a spatial form of a conventional demand-driven Leontief input-output model, which forms part of DSC's DELTA package[3]. The package as a whole provides the software platform for a variety of dynamic land-use/transport/economic models, forecasting change over time in one-year steps. The specific application (i.e. data and coefficients) used here is the same as that used recently in work for the UK2070 Commission[4].

2.3.02  That 2020 model run has been taken without modification as the modelled estimate of current demands and capacities, in the absence of any coronavirus effects. The input-output model operates at the level of 29 sectors (shown in Table 2-3) and  108 macrozones covering the whole of Great Britain, taking account of trade (in services as well as goods) between these macrozones.

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[3]  For model design see Simmonds and Feldman (2013).
[4]  See Halls and Simmonds (2020).

**Table 2-3 Employment/economic sectors and activities**

Note: the zonal model represents employment activities as listed in the first column; the macrozone model (including the input-output model) represents the sectors listed in the last column; in some cases the former are more detailed. Some of the disaggregation below SIC classification is our own estimation in order to represent firms working on different scales e.g. to split specialist planning consultancies working (inter)nationally from those working exclusively in their own localities.

| Employment activity number | Description | Standard Industrial Classification 2007 categories (Census 2011 WP605) | Economic Sector Number |
|---|---|---|---|
| 21 | Primary Activities | A Agriculture, forestry and fishing <br> B Mining and Quarrying | 61 |
| 22 | Food Stuffs | C10-12 Manufacturing: Food, beverages and tobacco | 62 |
| 23 | Textiles | C13-15 Manufacturing: Textiles, wearing apparel and leather and related products | 63 |
| 24 | Paper Products | C16,17 Manufacturing: Wood, paper and paper products | 64 |
| 25 | Chemicals | C19-22 Manufacturing: Chemicals, chemical products, rubber and plastic | 65 |
| 26 | Low Technology Manufacturing | C23-25 Manufacturing: Low tech | 66 |
| 27 | High Technology Manufacturing | C26-30 Manufacturing: High tech | 67 |
| 28 | Other Manufacturing | C18, 31, 32 Manufacturing: Other | 68 |
| 29 | Utilities | D Electricity, gas, steam and air conditioning supply <br> E Water supply, sewage, waste management and remediation activities | 69 |
| 30 | Construction | F Construction | 70 |
| 31 | National Retail | G Wholesale and retail trade; repair of motor vehicles and motor cycles | 71 |
| 32 | Local Retail | | 72 |
| 33 | Wholesale Retail | | 73 |
| 34 | Transport | H Transport and storage | 74 |
| 35 | Hotels and Restaurants | I Accommodation and food service activities | 75 |
| 36 | Based Information Technologies | J Information and communication | 76 |
| 37 | National Finance | K Financial and insurance activities | 77 |
| 38 | Regional Finance | | 78 |
| 39 | Local Finance | | 79 |
| 40 | Highly concentrated Other Business | L Real estate activities <br> M Professional, scientific and technical activities <br> N Administrative and support service activities | 80 |
| 41 | Medium concentrated Other Business | | 81 |
| 42 | Medium dispersed Other Business | | 82 |
| 43 | Highly dispersed Other Business | | 83 |

| Employment activity number | Description | Standard Industrial Classification 2007 categories (Census 2011 WP605) | Economic Sector Number |
|---|---|---|---|
| 44 | National Public Administration | O Public administration and defence; compulsory social security | 84 |
| 45 | Local Public Administration | | 85 |
| 46 | Primary and Secondary Education | P Education | 86 |
| 47 | Higher Education | | |
| 48 | Other Education levels | | |
| 49 | National Health | Q Human health and social work activities | 87 |
| 50 | Local Health | | 88 |
| 51 | Other Employment Activities | R and S: Arts, entertainment and recreation; other service activities | 89 |
| | | T Activities of households as employers; undifferentiated goods - and services - producing activities of households for own use | |
| | | U Activities of extraterritorial organisations and bodies | |

*2.3.03* A finer level of the model operates for the 380 local authorities; this level of the model takes account of more detailed effects on employment location (particularly the supply of floorspace) and models the residential location of households and the supply of labour from those households to fill the modelled jobs, allowing for commuting between local authority areas. Different types of labour are represented as four "socio-economic levels" based on aggregation of major groups in the ONS Standard Occupational Classification (see Table 2-4).

**Table 2-4 Socio-economic levels: definitions**

| SEL | Socio-Economic Level | Standard Occupational Classification (major groups) | |
|---|---|---|---|
| 1 | Professional and managerial occupations | 1 | Managers and senior Officials |
| | | 2 | Professional Occupations |
| 2 | Other non-manual occupations | 3 | Associate Professional and Technical Occupations |
| | | 4 | Administrative and Secretarial Occupations |
| 3 | Skilled trades, sales and service occupations | 5 | Skilled trade Occupations |
| | | 6 | Personal Service Occupations |
| | | 7 | Sales and Customer Service Occupations |
| 4 | Less skilled and elementary occupations | 8 | Process, Plant and Machine Operatives |
| | | 9 | Elementary Occupations |

*Representing the direct effects*

*2.3.04* The demand-driven nature of the model means that there is no explicit mechanism to introduce supply changes – such as the shutdown of parts of particular industries. All the direct impacts of coronavirus are therefore input by making appropriate adjustments to demand coefficients

- household consumption expenditure on each sector is reduced by the "risk effect" percentage shown in Table 2-2;

- other final demands for each sector (i.e. exports, government consumption, and investment expenditure) are reduced by the same percentages;

- intermediate demands (e.g. the £ of agricultural output used to produce £1 of catering output) are reduced by the same percentages (by adjusting the technical coefficients of the model).

2.3.05  Note that all of these changes are introduced uniformly across Great Britain. Spatial differences therefore arise from

- different sector mixes in different macrozones;

- spatial effects: other things being equal, indirect effects will be rather greater close to macrozones where the sector mix leads to greater direct effects.

*Results*

2.3.06  The business-as-usual employment in the model is slightly different from that in the IPPR figures (probably because our definition includes self-employment". As a check, we calculated the direct impacts, and extracted their impacts by the socio-economic level of the workers affected. We then ran the model to calculate indirect (Type I multiplier) effects.

2.3.07  The impacts by sector (aggregated to the common definitions of SIC and model) are shown in Table 2-5 and Figure 2-1.

**Table 2-5 Direct and indirect impacts of coronavirus: potential reductions in workers working by socio-economic level[iii]**

| SIC | Sector | Employment | Potential direct impact | | Potential direct and indirect impact | |
|------|-----------------------|---------------|------------|----------|--------------|----------|
| . | . | 2020 Ref Case | Workers | %workers | Workers | %workers |
| AB | Primary | 319,140 | 0 | 0.0 | -77,227 | -24.2 |
| C | Manufacturing | 2,408,255 | -457,568 | -19.0 | -921,676 | -38.3 |
| DE | Utilities | 389,856 | 0 | 0.0 | -69,680 | -17.9 |
| F | Construction | 2,467,806 | -937,766 | -38.0 | -1,329,452 | -53.9 |
| G | Distribution | 4,605,534 | -2,072,491 | -45.0 | -2,484,498 | -53.9 |
| H | Transport | 1,406,754 | -534,566 | -38.0 | -820,474 | -58.3 |
| I | Food & accommodation | 1,951,027 | -1,463,271 | -75.0 | -1,497,086 | -76.7 |
| J | Info & comms | 1,226,617 | -91,996 | -7.5 | -379,897 | -31.0 |
| K | Finance & insurance | 738,177 | -140,254 | -19.0 | -267,155 | -36.2 |
| LMN | Business services | 5,089,478 | -1,283,047 | -25.2 | -1,990,155 | -39.1 |
| O | Public administration | 1,396,118 | -104,709 | -7.5 | -165,231 | -11.8 |
| P | Education | 2,931,282 | -219,846 | -7.5 | -361,623 | -12.3 |
| Q | Health & social work | 3,793,128 | -284,485 | -7.5 | -359,159 | -9.5 |
| RSTU | Other | 1,534,939 | -1,151,205 | -75.0 | -1,207,785 | -78.7 |
| *All* | *Total* | *30,258,113* | *-8,741,203* | *-28.9* | *-11,931,101* | *-39.4* |

2.3.08  The direct impact in the model comes out as a slightly larger percentage than in Table 2-2 (28.9% rather than 27.3%). This is due to the differences between the 2020 data forecast in the DSC model (which includes self-

employment) and the 2018 Business Register and Employment Survey (BRES) data used by IPPR.

**Figure 2-1 Model results: direct and indirect potential impacts by sector[iv]**
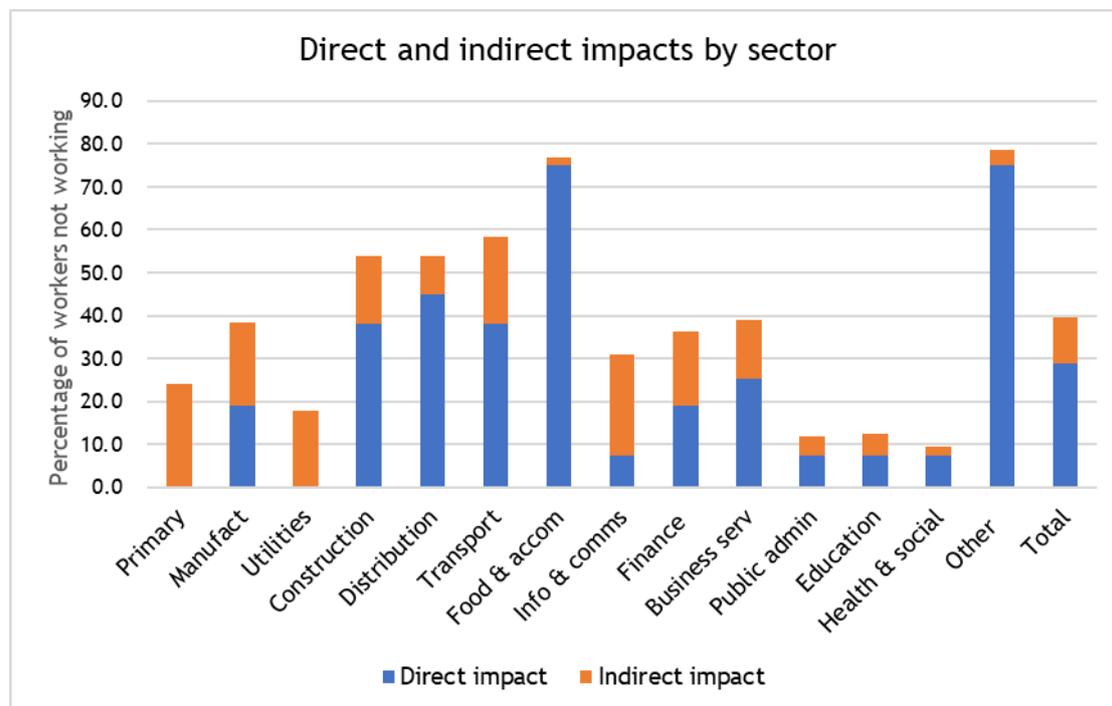


2.3.09 Note that this is a **potential** impact, in that it assumes that

- all of the negative indirect impacts have arisen;

- indirect effects are fully additional to the direct impacts i.e. ignoring the likelihood that work lost due to indirect impacts is the same work lost due to the direct impacts (to be considered later in this Task);

- there are no adjustments to final or intermediate demand i.e. neither final nor intermediate consumers purchase different goods and services instead of those that are not currently available;

- potential positive impacts e.g. additional work in health services are not yet considered;

- we do not take account of any changes in labour supply e.g. workers from other countries returning there (or vice versa);

- it ignores the possibilities that firms will retain labour either by paying them out of past profits and/or through the government furlough scheme.

2.3.10 Table 2-5 shows that

- sectors that are not directly affected could potentially be significantly impacted by indirect effects – a 24% loss of work in the case of primary industries;

- conversely, the sectors that are most affected – food and accommodation, other (which includes entertainment and other consumer services) - are relatively little affected by indirect effects

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(3.7% on top of the initial 75% for "other" – though this is over 14% of what remains after the direct effects);

- the impacts of indirect effects on sectors that are only slightly affected by direct effects – from a further 23% on information and communication-based industries down to just 2% on health and social work.

*2.3.11* The overall impacts by socio-economic level are shown in Table 2-6 below.

**Table 2-6 Direct and indirect impacts of coronavirus: potential reduction in workers working by socio-economic level[v]**

For definitions of socio-economic levels see Table 2-4

| Input | SEL1 | SEL2 | SEL3 | SEL4 | Total |
|---|---|---|---|---|---|
| Adjusted Middle Scenario | -24% | -24% | -40% | -33% | -29% |
| Effect including indirect losses | -34% | -34% | -51% | -46% | -39% |

**Figure 2-2 Direct and indirect impacts by socio-economic level[vi]**
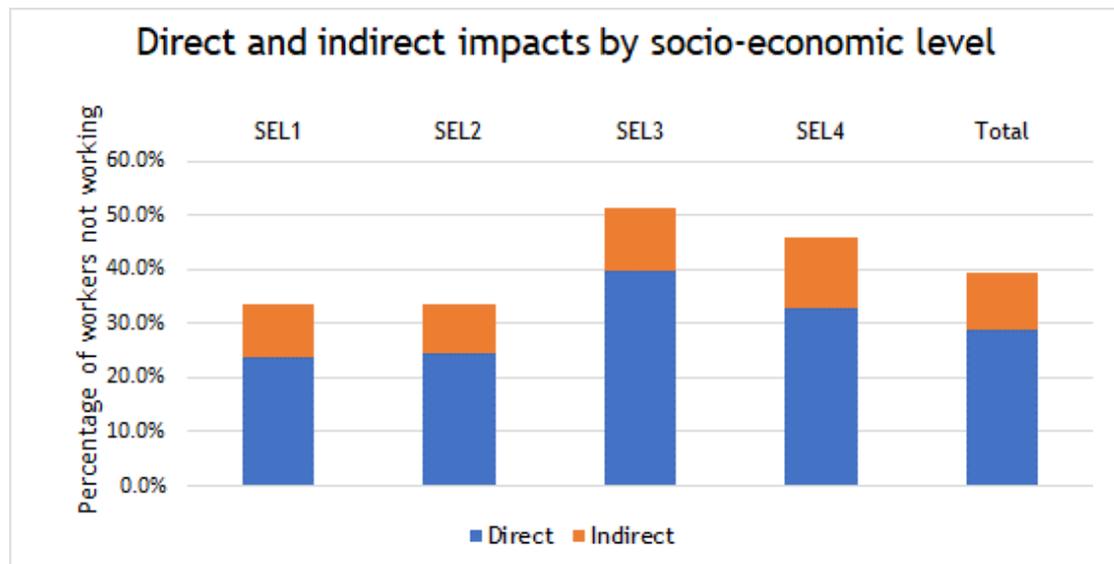


*2.3.12* SEL 3 includes sales workers and is markedly the worst affected by the direct effects. The indirect effects are relatively worse for the non-manual groups, increasing the impacts by nearly half, but still leaving the overall impacts worse for the (broadly) manual categories.

*2.3.13* Differences in spatial impacts come about up mainly from the industry mix in each area, but with some modifications as a result of localised trade patterns e.g. local business services that are not directly affected will be indirectly affected more in or around areas where the direct effect is greater. The direct effects by macrozone range from -26% to -42%, and the combined direct+impact effects from -34% to -47. The clearest spatial conclusion is for the direct+impact effects where the five least affected macrozones are Scottish Borders, Dumfries and Galloway, Barrow in Furness, South Holland and Inverclyde & North Ayrshire – areas relatively weak in (private) service sector employment and more concentrated in manufacturing and or agriculture.

*2.3.14* The results are slightly but not greatly different for the direct+impact effect. It is possible that the kinds of places often described as "left behind" by changes in the economy over the last half century may be a little less impacted by the employment losses resulting from coronavirus – though it is also likely that the "left behind" places have higher proportions of households with limited resources and at greater risk of destitution in the event of losing work.

## 2.4    Comparison of Step 3 output with observed data

*2.4.01* The most helpful observed data identified is that from ONS' new Business Impact of Coronavirus (COVID-19) Survey (BICS). Results from Wave 2 of that survey were published in late April[5] including data on the proportions of workers

- on furlough leave (under the Coronavirus Job Retention Scheme);

- made redundant;

- other (including sickness and self-isolation);

- working as normal.

*2.4.02* We have interpreted "on furlough leave" and "made redundant" as representing a low estimate of the proportions of (former) workers not working, and the total proportion not "working as normal" as a high estimate. (The uncertainty is partly because, whilst the "other" category explicitly includes those sick (regardless of their sickness) and self-isolated), from the information we have it could also included "working maximum possible overtime".)

*2.4.03* These ONS figures are given separately for "businesses that are still trading" and "businesses that have paused trading"; using other ONS figures we have combined these to get overall figures by sector.

*2.4.04* Plotting our own estimates of direct plus indirect impacts against this interpretation of the ONS figures gives the bar chart below (The ONS results need to be treated with caution: they are based on a modest sample survey with voluntary participation. Not surprisingly, the original ONS results are defined as "experimental statistics" (and we have performed some further manipulation on them).

*2.4.05* If we cautiously compare the model results (red bars) with our interpretation of the ONS findings (grey bars) then we immediately see that the overall model results (far right hand group) are between the "low" and "high" estimates obtained from the ONS data, but closer to the "high" end of the range.

*2.4.06* This is a cause of concern about the real situation, because it suggests that the real impacts, inclusive of people not working because they are sick (with Covid-19 or otherwise) or self-isolating, may already be greater than the "potential" effect we have been calculating.

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[5]  Wave 3 has since been reported but does not include equivalent data (https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronavirustheukeconomyandsocietyfasterindicators/30april2020#business-impact-of-the-coronavirus)

*2.4.07*   Figure 2-3, with impacts plotted as positives).  Note: certain categories are not explicit in the ONS results, but are included in the all-sector figures; these are omitted from the chart. The proportion of workers made redundant is almost zero; on the other hand the proportion of businesses that did not respond because they have permanently closed is not known, but implies that, other things being equal, the true figures might be slightly higher.

*2.4.08*   The ONS results need to be treated with caution: they are based on a modest sample survey with voluntary participation. Not surprisingly, the original ONS results are defined as "experimental statistics" (and we have performed some further manipulation on them).

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**Figure 2-3 Model outputs compared with ONS data[vii]**
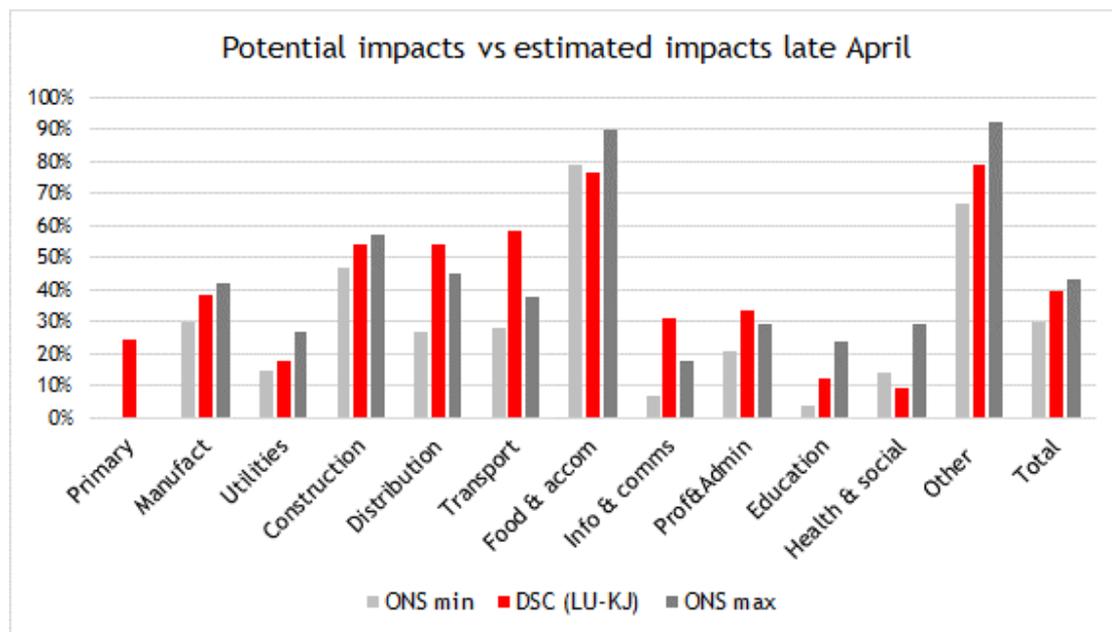


*2.4.11*   Considering the results by sector (and bearing in mind the uncertainty around the observed data) there are four sectors where the modelling is overestimating impacts, and one where it is underestimating them.

*2.4.12*   The four which are overestimated are distribution, transport, information & communications and professional/administrative services. For the first two, it is possible that the discrepancy may because parts of these sectors – for example, the delivery services provides by the supermarket chains – have recruited additional workers to meet needs arising from the coronavirus emergency. It is also possible that the emergency positive impacts in the distribution and transport sectors have, by their nature, come about very quickly, whilst negative impacts are working through more slowly (e.g.

announcements about British Airways and Ryanair redundancies during the week ending 2 May).

*2.4.13* For professional/administrative services, we would suggest that the time lags are longer, as well as parts of these sectors (including public administrative) gaining additional work from the emergency. One element we suspect (partly from our own experience) is that many professional services take time to deliver; these may experience the downturn in coming months, as a result of clients whose work is disrupted now not commissioning the work that they would normally be commissioning.

*2.4.14* The one sector where the model is under-estimating impacts is the health sector. We suspect this is because the direct impacts input to the model do not take sufficient account of the numbers of doctors, nurses and care workers who have themselves become ill with Covid-19 or been required to self-isolate.

*2.4.15* Whilst we should not rely too heavily on the ONS data (or on our processing of it to obtain overall results), and whilst we have not explicitly considered the timing in our modelling of the potential consequences, it seems that

- to date we may be over-estimating the impacts on sectors where additional recruitment has taken place, or where activity is subject to significant timelags;

- we may be under-estimating effects of sickness and self-isolation

- overall, our estimate of the potential impact is not far from the estimate of the current impacts, even before considering induced effects.

*2.4.16* This tends to suggest that the true potential impact may well be rather larger than we have so far estimated.

# 3 FURTHER TESTS

## 3.1 <u>Introduction</u>

*3.1.01* We were tasked with creating six further tests to look at the impact Covid-19 and the lockdown will have on the British Economy.

*3.1.02* We were given three scenarios of assumptions, of differing levels of optimism of the impact Covid-19 will have on different sectors. The three scenarios were known as: Worse Case, Middle Case and Better Case. Two tests were made for each scenario:

- one looking at the recovery phase, being the impact in late 2020

- the other medium-term phase, where we looked at the impact in mid-2021.

*3.1.03* Table 3.1 shows the definition of each test.

*3.1.04* The models which were ran to generate our outputs were Production and Trade Model MP14 and then the Employment Model ME12.

*3.1.05*  Each of the tests were based on the Business as Usual test, KJ.

**Table 3-1 Test Definitions**

| Test | Scenario | Phase |
|------|----------|-------|
| LX | Worse Case | Recovery |
| LY | Worse Case | Medium Term |
| MD | Middle Case | Recovery |
| ME | Middle Case | Medium Term |
| MF | Better Case | Recovery |
| MG | Better Case | Medium Term |

## 3.2 Inputs to the Model

*3.2.01*  We received data on the total closure of each sector, for the different tests that were made. A proportion was applied to the total closure targets to calculate how much each sector would close directly due to lockdown. When we run the model, it calculates the additional closure through indirect effects i.e. the (negative) multiplier effects of the input direct closure[viii].

*3.2.02*  The inputs for each test can be found in Table 3.2 (Worse Case Tests) , 3.3 (Middle Case Tests) and 3.4 (Better Case Tests).

*3.2.03*  The results are shown below the tables. They show that the food and accommodation sector is the most impacted from the lockdown. With Other and the Construction sector also badly impacted. Business Services sector, Utilities Education and Health fair well with the lowest percentage closures out of all the sectors.

*3.2.04*  Figure 3-1 shows the models results of the lockdowns direct and indirect impact by sector, in the worse case recovery phase, test LX.

*3.2.05*  Figure 3-2 shows the models results of the lockdowns direct and indirect impact by sector, in the worse case  in the medium term, test LY.

*3.2.06*  Figure 3-3 shows the models results of the lockdowns direct and indirect impact by sector, in the middle case recovery phase, test MD.

*3.2.07*  Figure 3-4 shows the models results of the lockdowns direct and indirect impact by sector, in the middle case in the medium term, test ME.

*3.2.08*  Figure 3-5 shows the models results of the lockdowns direct and indirect impact by sector, in the better case recovery phase, test MF.

*3.2.09*  Figure 3-6 shows the models results of the lockdowns direct and indirect impact by sector, in the better case in the medium term, test MG.

**Table 3-2 Worse Case Tests  Sector Closure Inputs**

| | Industry Sector | Recovery Phase , Test LX | | Medium Term, Test LY | |
|---|---|---|---|---|---|
| | - | Target Closure (%) | Direct Input % Workers | Target Closure (%) | Direct Input % Workers |
| A | Agriculture, forestry and fishing | 5% | 0% | 0% | 0% |
| B | Mining and quarrying | 5% | 0% | 0% | 0% |
| C | Manufacturing | 15% | 7% | 5% | 2% |
| D | Electricity, gas, steam & aircon | 5% | 0% | 0% | 0% |
| E | Water, sewerage, waste mgt | 20% | 0% | 0% | 0% |
| F | Construction | 25% | 18% | 15% | 11% |
| G | Wholesale and retail trade; | 25% | 21% | 10% | 8% |
| H | Transportation and storage | 30% | 20% | 15% | 10% |
| I | Accommodation and food service act | 45% | 44% | 20% | 20% |
| J | Information and communication | 10% | 2% | 0% | 0% |
| K | Financial and insurance activities | 10% | 5% | 5% | 3% |
| L | Real estate activities | 20% | 13% | 10% | 6% |
| M | Professional, scientific and technical | 10% | 6% | 5% | 3% |
| N | Administrative and support services | 20% | 13% | 10% | 6% |
| O | Public admin, defence, soc sec | 5% | 3% | 0% | 0% |
| P | Education | 10% | 6% | 5% | 3% |
| Q | Health and social work | 10% | 8% | 0% | 0% |
| R | Arts, entertainment and recreation | 35% | 33% | 20% | 19% |
| S | Other service activities | 20% | 19% | 10% | 10% |
| | | | | | |
| *Total* | | *18.62%* | *11.17%* | *7.65%* | *4.99%* |

**Table 3-3 Middle Case Tests Sector Closure Inputs**

| Industry Sector | | Recovery Phase, Test MD | | Medium Term, Test ME | |
|---|---|---|---|---|---|
| - | | Target Closure (%) | Direct Input % Workers | Target Closure (%) | Direct Input % Workers |
| A | Agriculture, forestry and fishing | 2.28% | 0.00% | 0.00% | 0.00% |
| B | Mining and quarrying | 2.28% | 0.00% | 0.00% | 0.00% |
| C | Manufacturing | 15.00% | 7.45% | 5.00% | 2.48% |
| D | Electricity, gas, steam & aircon | 4.21% | 0.00% | 0.00% | 0.00% |
| E | Water, sewerage, waste mgt | 4.21% | 0.00% | 0.00% | 0.00% |
| F | Construction | 20.00% | 14.11% | 10.00% | 7.05% |
| G | Wholesale and retail trade; | 15.00% | 12.51% | 10.00% | 8.34% |
| H | Transportation and storage | 20.00% | 13.03% | 15.00% | 9.77% |
| I | Accommodation and food service act | 30.00% | 29.32% | 15.00% | 14.66% |
| J | Information and communication | 5.00% | 1.21% | 0.00% | 0.00% |
| K | Financial and insurance activities | 3.00% | 1.57% | 3.00% | 1.57% |
| L | Real estate activities | 15.00% | 9.67% | 10.00% | 6.45% |
| M | Professional, scientific and technical | 8.00% | 5.16% | 3.00% | 1.93% |
| N | Administrative and support services | 15.00% | 9.67% | 10.00% | 6.45% |
| O | Public admin, defence, soc sec | 0.00% | 0.00% | 0.00% | 0.00% |
| P | Education | 5.00% | 3.04% | 5.00% | 3.04% |
| Q | Health and social work | 5.00% | 3.96% | 0.00% | 0.00% |
| R | Arts, entertainment and recreation | 20.45% | 19.49% | 12.72% | 12.13% |
| S | Other service activities | 20.45% | 19.49% | 12.72% | 12.13% |
| | | | | | |
| *Total* | | *12.32%* | *7.85%* | *6.67%* | *3.89%* |

**Table 3-4 Better Case Tests Sector Closure Inputs**

| Industry Sector | | Recovery Phase , Test MF | | Medium Term, Test MG | |
|---|---|---|---|---|---|
| - | | Target Closure (%) | Direct Input % Workers | Target Closure (%) | Direct Input % Workers |
| A | Agriculture, forestry and fishing | 1% | 0% | 0% | 0% |
| B | Mining and quarrying | 1% | 0% | 0% | 0% |
| C | Manufacturing | 10% | 5% | 2% | 1% |
| D | Electricity, gas, steam & aircon | 3% | 0% | 0% | 0% |
| E | Water, sewerage, waste mgt | 3% | 0% | 0% | 0% |
| F | Construction | 13% | 9% | 5% | 4% |
| G | Wholesale and retail trade; | 10% | 8% | 7% | 6% |
| H | Transportation and storage | 15% | 10% | 10% | 7% |
| I | Accommodation and food service act | 22% | 22% | 12% | 12% |
| J | Information and communication | 3% | 1% | 0% | 0% |
| K | Financial and insurance activities | 2% | 1% | 0% | 0% |
| L | Real estate activities | 10% | 6% | 7% | 5% |
| M | Professional, scientific and technical | 5% | 3% | 0% | 0% |
| N | Administrative and support services | 10% | 6% | 6% | 4% |
| O | Public admin, defence, soc sec | 0% | 0% | 0% | 0% |
| P | Education | 3% | 2% | 0% | 0% |
| Q | Health and social work | 3% | 2% | 0% | 0% |
| R | Arts, entertainment and recreation | 15% | 15% | 9% | 8% |
| S | Other service activities | 15% | 15% | 9% | 15% |
| | | | | | |
| *Total* | | *8.39%* | *4.77%* | *3.90%* | *2.30%* |

## 3.3    Sector Results

*3.3.01*    The following section shows the results of the six tests.

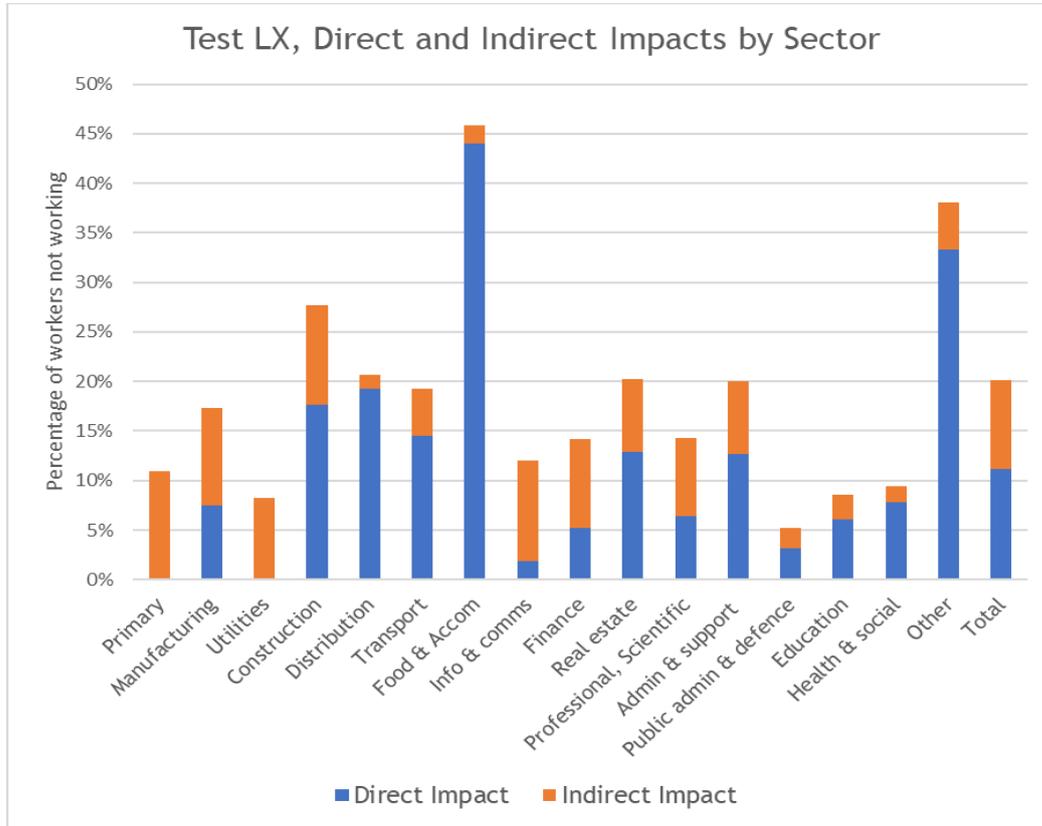**Figure 3-2 Test LX , Worse Case Recovery Phase , Sector Closure Output**



Test LX, Direct and Indirect Impacts by Sector

**Figure 0-3 Test LY, Worse Case in the Medium Term, Sector Closure Output**
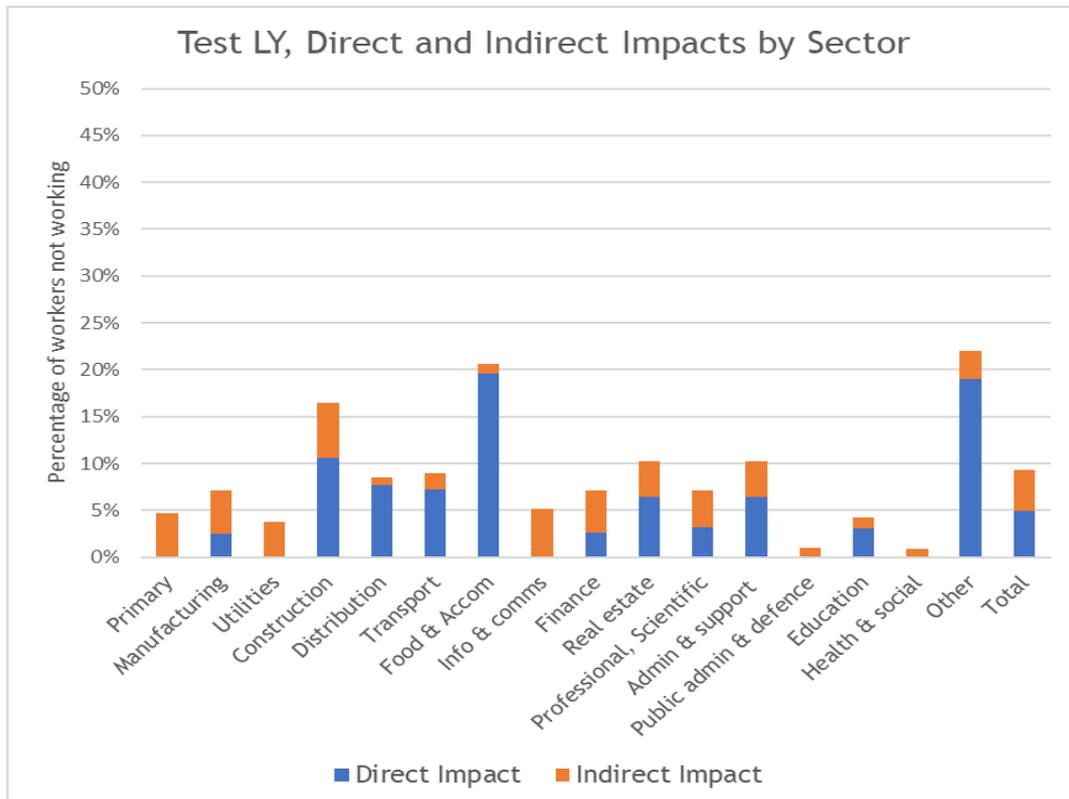


Test LY, Direct and Indirect Impacts by Sector

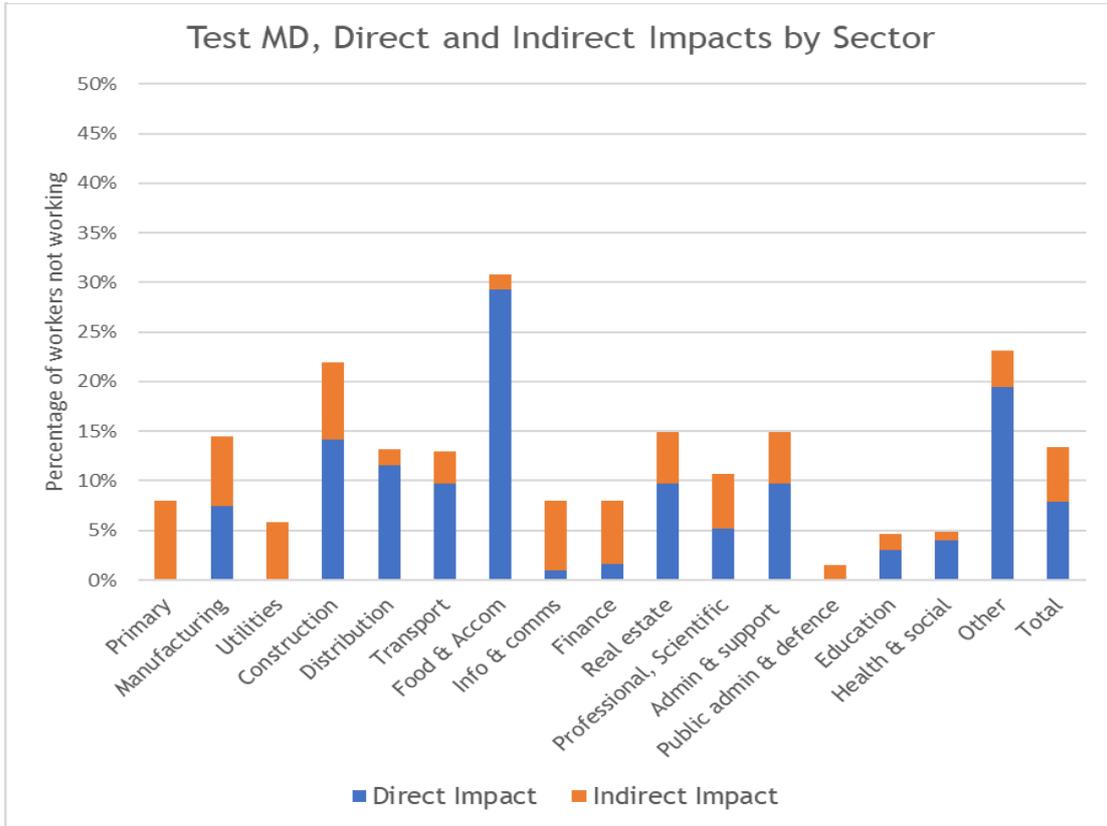**Figure 3-4 Test MD, Middle Case Recovery Phase , Sector Closure Output**



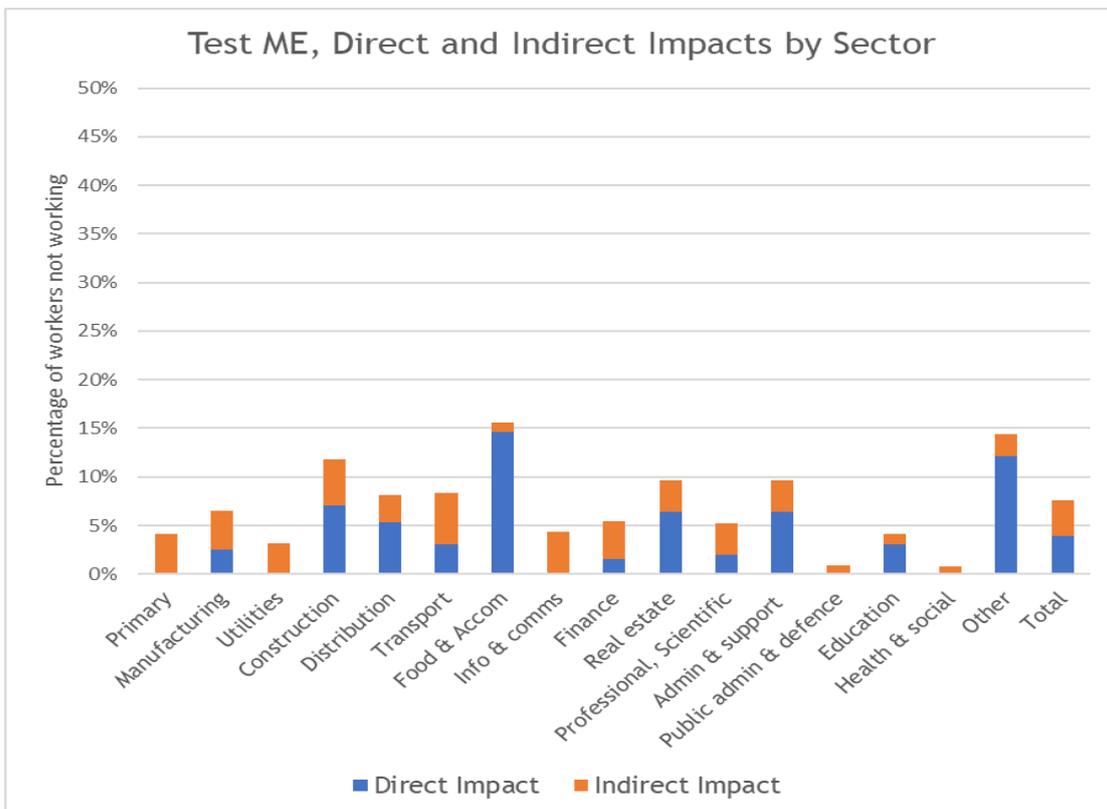**Figure 0-5 Test ME, Middle Case in the Medium Term, Sector Closure Output**
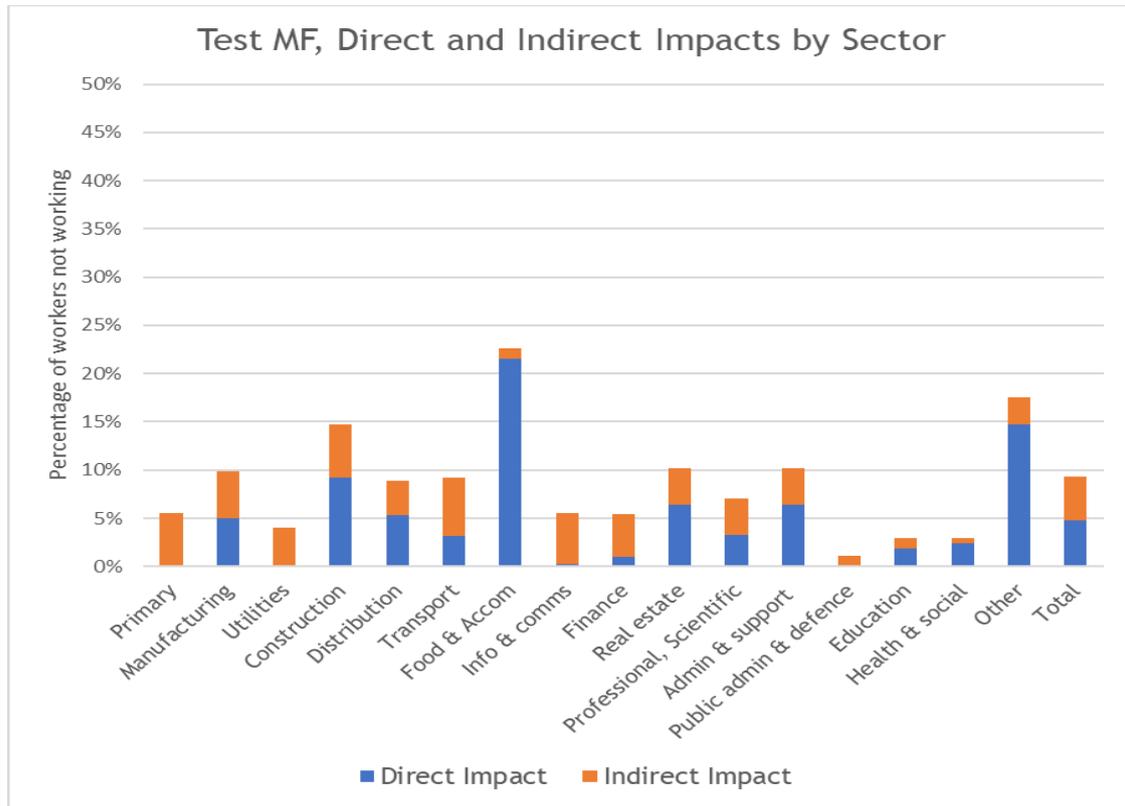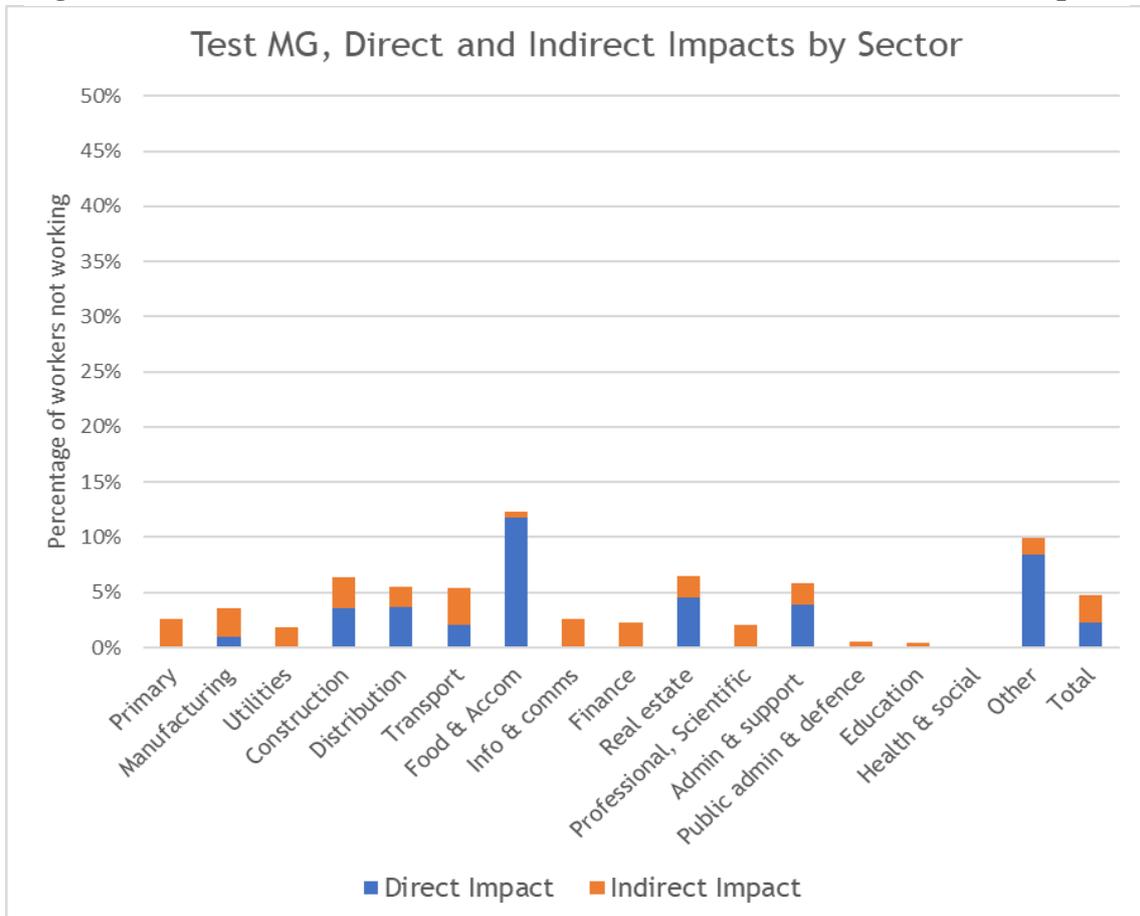
**Figure 3-6 Test MF, Better Case Recovery Phase , Sector Closure Output**



**Figure 3-7 Test MG, Better Case in the Medium Term, Sector Closure Output**

## 3.4 **SEL Results**

*3.4.01* For each test, their newly generated MPEM file was compared to the equivalent Business as Usual MPEM file from test, KJ. The MPEM yy ??.dat holds data on the Production-related expected employment by sector and area. This comparison was done to gather insight into how each of the different Social Economic Levels were impacted by the lockdown.

*3.4.02* The results of each test are shown below. They show the total percentage of SEL workers not returning to work, due to direct impact of the lockdown and due to the indirect effect. In each of the tests SEL 3 workers were the most affected by the lockdowns impact on the economy.

*3.4.03* Figure 0-7 shows the percentage of SEL workers not working in the recovery phase of the worse case, test LZ, due to the direct and indirect impacts of lockdown.

*3.4.04* Figure 0-8 shows the percentage of SEL workers not working in the medium term of the worse case, test LY, due to the direct and indirect impacts of lockdown..

*3.4.05* Figure 0-9 shows the percentage of SEL workers not working in the recovery phase of the middle case, test MD, due to the direct and indirect impacts of lockdown.

*3.4.06* Figure 0-10 shows the percentage of SEL workers not working in the medium term of the middle case, test ME, due to the direct and indirect impacts of lockdown.

*3.4.07* Figure 0-11 shows the percentage of SEL workers not working in the recovery phase of the better case, test MF, due to the direct and indirect impacts of lockdown.

*3.4.08* Figure 0-12 shows the percentage of SEL workers not working in the medium term of the better case, test MG, due to the direct and indirect impacts of lockdown.

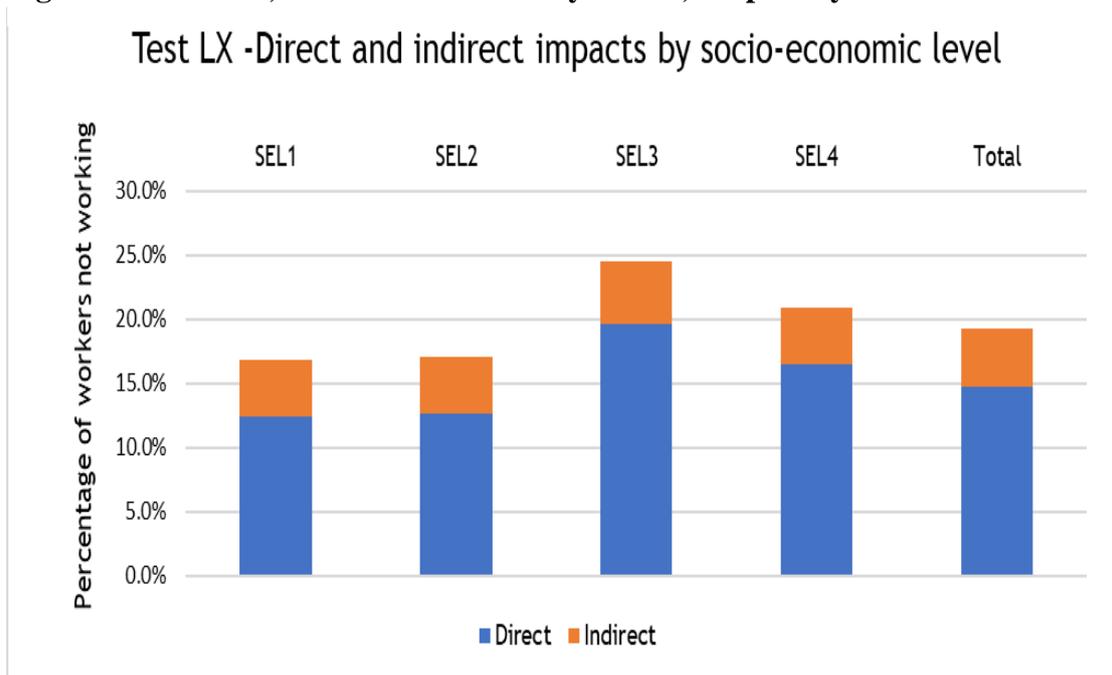**Figure 3-7 Test LX, Worse Case Recovery Phase , Impact by SEL**



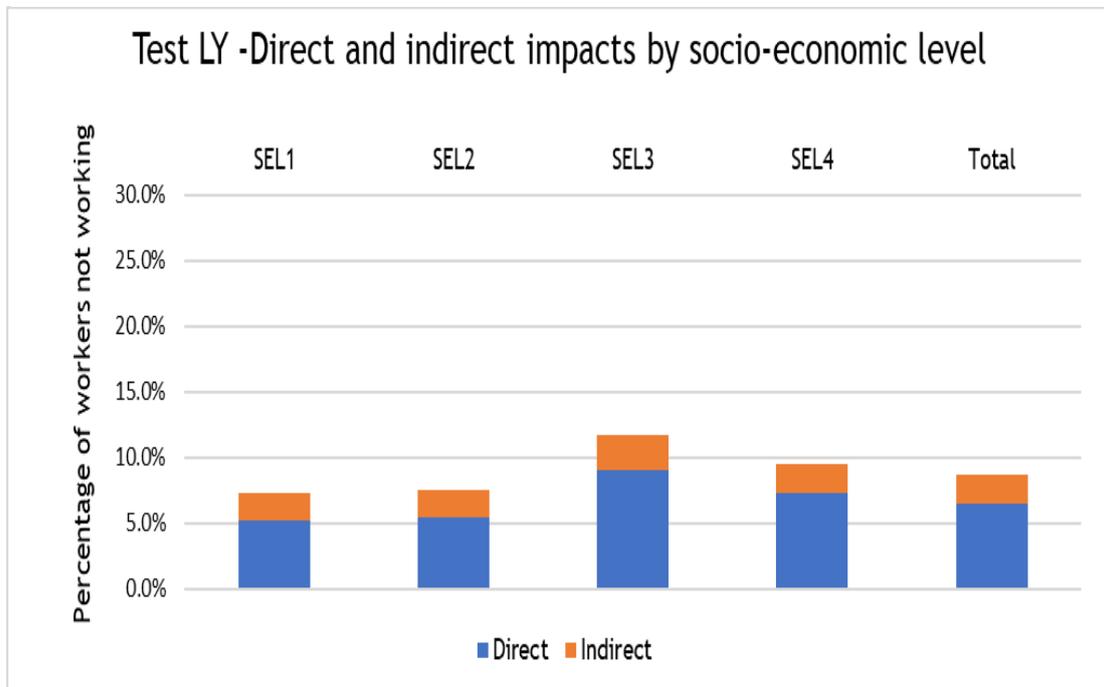**Figure 3-8  Test LY, Worse Case in the Medium Term,  Impact by SEL**

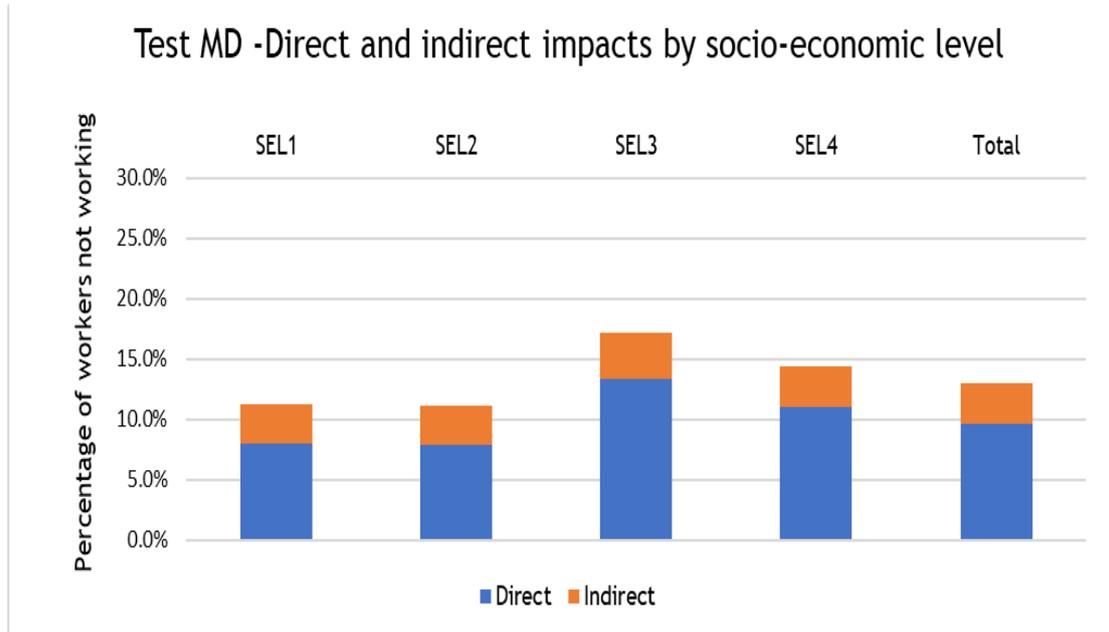**Figure 3-9 Test MD, Middle Case Recovery Phase , Impact by SEL**



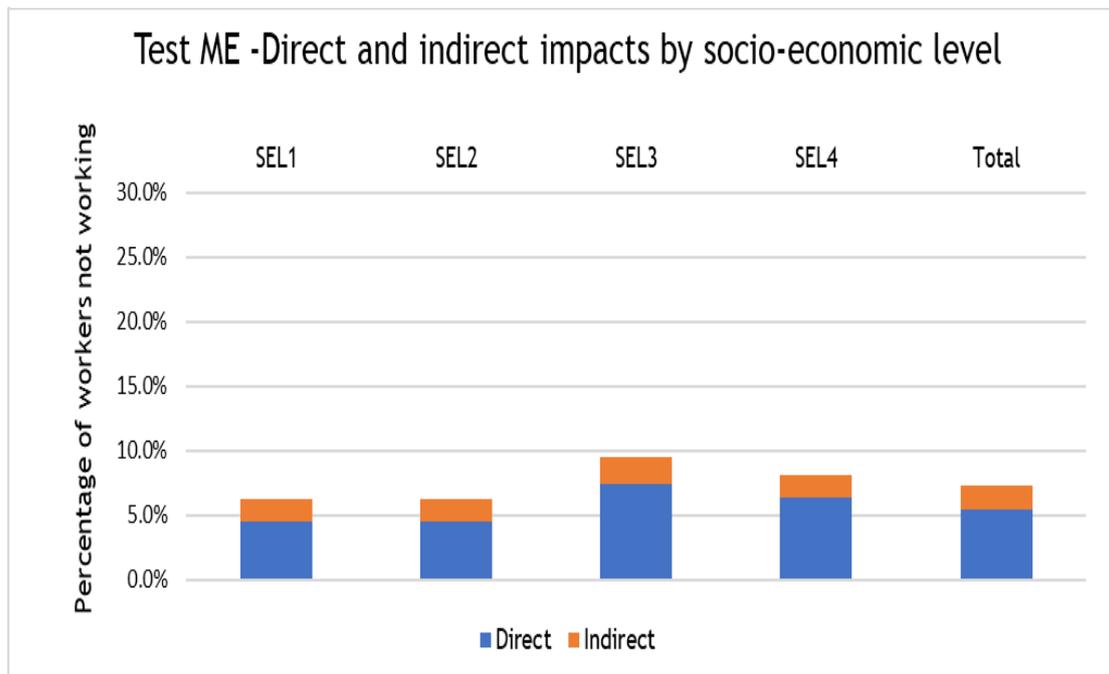**Figure 3-10 Test ME, Middle Case in the Medium Term, Impact by SEL**

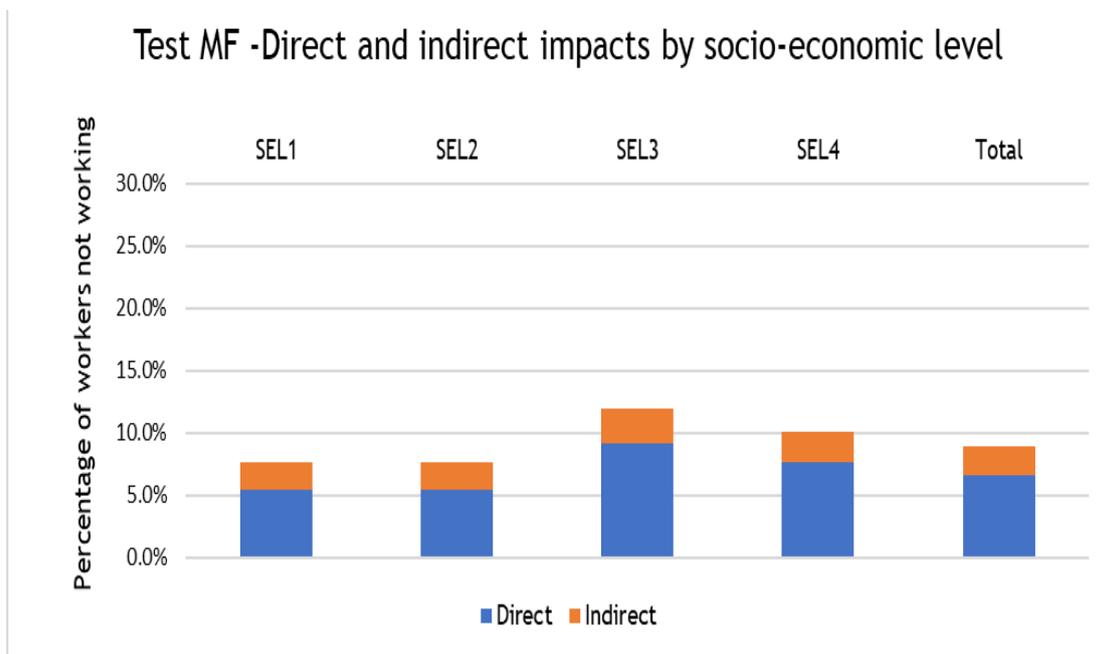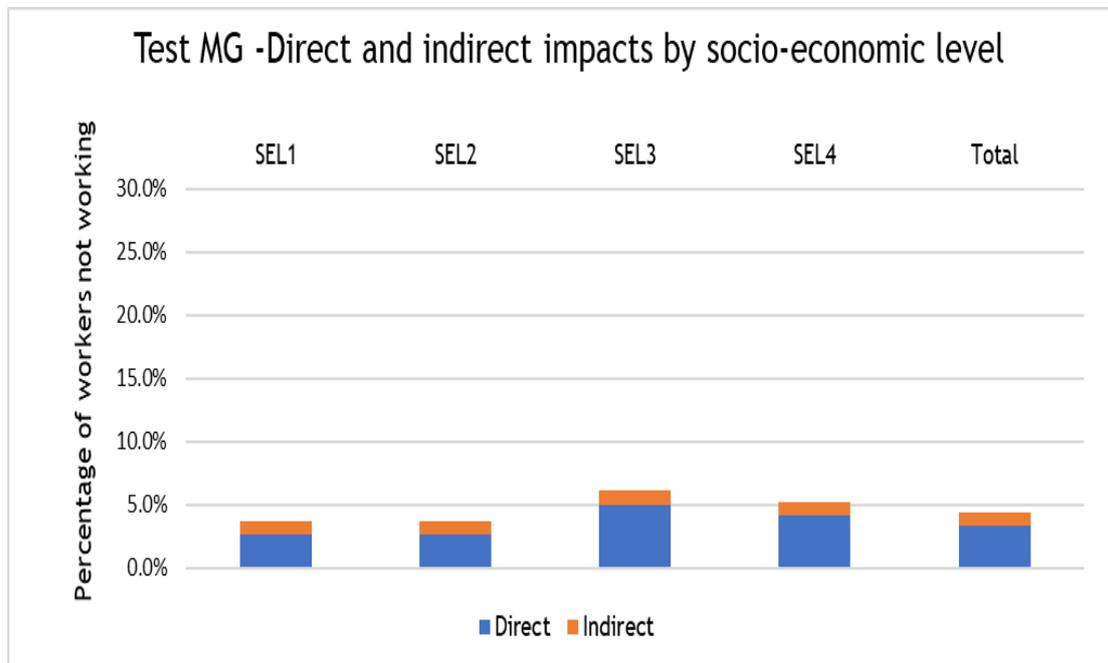**Figure 3-11 Test MF, Better Case Recovery Phase , Impact by SEL**



**Figure 3-12 Test MG, Better Case in the Medium Term, Impact by SEL**

### 3.5 Spatial distribution of the Impact of the Worst hit activity

*3.5.01* The model output also shows the spatial distribution of the impact of the lockdown on Great Britain. Map 3.1 illustrates the regional impact the lockdown has on the hotel and restaurants (activity 35) SEL 3 workers. It shows the percentage of SEL 3 workers in the hotel and restaurant not going to work in the Worse Case scenarios recovery phase. This SEL and activity was represented here as they were the most impacted SEL in the worst hit activity.

**Map 3-1 Spatial Distribution of Workers Most Impacted from lockdown, Test LX**



Percentage of SEL 3 Not Working,
Compared to Business as Usual, Test KJ,
In Activity 35 - Hotels and Restaurants

Percentage of SEL3
workers not working (%)
- 46.5 - 46
- 46 - 45.5
- 45.5 - 45
- 45 - 44.5
- 44.5- 44

0    75    150 km

CN
13/07/2020
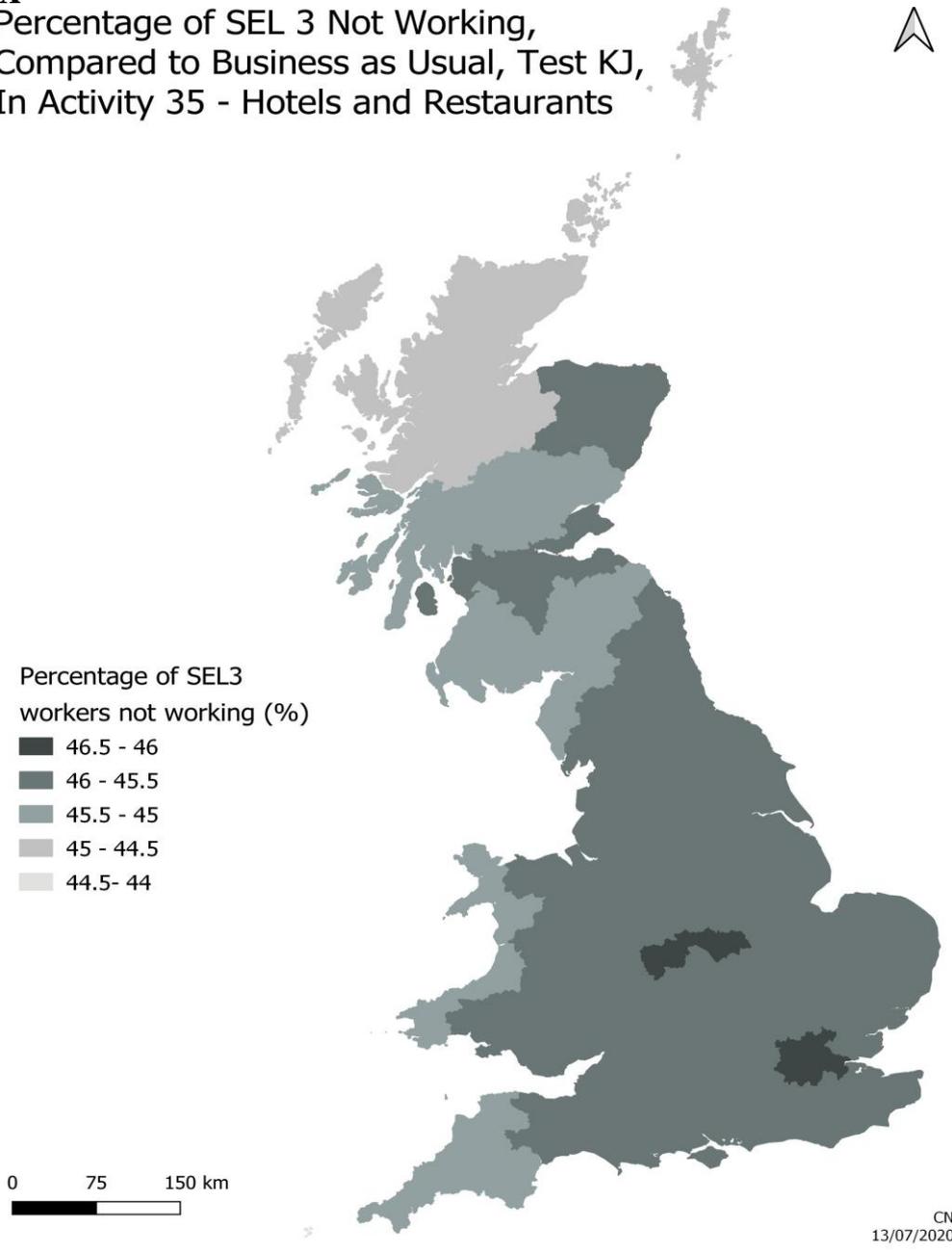
# 4    CONCLUSION

*4.1.01*    The analysis provided what we believe to be reasonable assessments of the likely consequences of different scenarios at a relatively high level of spatial detail, and was able to supply these quickly and at modest cost.

*4.1.02*    Our outputs are just an input to an input in the wider project, but we hope that they have been found helpful in making the case that Trussell Trust is pressing for measures to eliminate food poverty in Britain.

# REFERENCES

Halls, A, and D Simmonds (2020): *Modelling a Pan-National UK Network*. Report prepared for the UK2070 Commission. Available at http://uk2070.org.uk/publications/ or https://www.davidsimmonds.com/publications.

OECD (2020): *Evaluating the initial impact of COVID-19 containment measures on economic activity*. https://www.oecd.org/coronavirus/policy-responses/evaluating-the-initial-impact-of-covid-19-containment-measures-on-economic-activity/. Published 14 April 2020.

Simmonds, D and O Feldman (2013): Modelling the economic impacts of transport changes: experience and issues. In F Pagliara, M de Bok, D Simmonds and A Wilson (eds) (2013): *Employment location in cities and regions: models and applications*. Springer-Verlag, Heidelberg.

## Endnotes (for DSC reference only)

[i] IPPR_Supporting Spreadsheet_FInal, tab "Calculation of Risk Factor"

[ii] IPPR_Supporting Spreadsheet_FInal DSC revision v0

[iii] MPEM20LU analysis with outturn 200502.xlsx, tab "SIC Analysis"

[iv] MPEM20LU analysis with outturn 200502.xlsx, tab "SIC Analysis"

[v] mpem20LU analysis 200413.xlsx

[vi] mpem20LU analysis 200413.xlsx

[vii] MPEM20LU analysis with outturn 200502.xlsx, tab "SIC Analysis"

[viii] The new inputs were inserted into a spreadsheet. Which took the direct closure data and created new ARCD yy ??.dat, ARFD yy ??. dat files and a new MPIN03 block. The MPIN03 block was then inserted into MP12 yy ?? .inp file.  For each of the tests the Production and Trade Model MP14 and then the Employment Model ME12 was run. This was done by opening the DOS prompt and  entering MP14 yy ??/m, then ME12 yy ??