

Technical annex: Updated estimates of the cash-flow deficit of UK companies in a Covid-19 scenario¹

The 'UK corporate sector and Covid-19' chapter of the [August 2020 Financial Stability Report](#) presents analysis of how the Covid-19 shock might affect UK corporate finances this year. This technical annex describes the data and assumptions used to produce the analysis. It updates the material in the [May 2020 interim Financial Stability Report](#) and accompanying [technical annex](#). The updated analysis takes into account changes in the economic outlook since May and several modelling improvements. It also includes a novel and experimental approach to estimating the cash flow impact of the Covid-19 shock on small companies. Estimating the impact of the Covid-19 shock on the UK corporate sector carries a high degree of uncertainty, particularly for small companies given the additional assumptions that need to be made to compensate for more limited data availability.

1 Updated estimates of how the Covid-19 shock might affect corporate finances

Bank staff have modelled how the Covid-19 shock might affect UK company finances

For the [interim Financial Stability Report](#) in May, Bank staff produced indicative estimates of how the Covid-19 shock could affect the finances of UK companies.² This mechanical accounting exercise projected companies' cash flows over the 2020-21 financial year by applying a quarterly sequence of turnover shocks to a large sample of UK companies, along with simple assumptions for how they might adjust their costs and other cash flow items. The resulting 'cash-flow deficit', which is the sum of all negative cash flows in each quarter across all companies in the sample, can be thought of as an estimate of the additional liquidity that might be required by UK companies to weather the shock.

The August Financial Stability Report presents updated estimates of the cash-flow deficit for UK companies, based on a new macroeconomic scenario and a range of other modelling improvements

For the [August Financial Stability Report](#) (hereafter 'FSR'), Bank staff have updated their projection of company cash flows in the 2020-21 financial year. This updated analysis takes into account a new macroeconomic scenario, which is designed to be broadly consistent with the central projection set out in the [August Monetary Policy Report](#) (hereafter 'MPR').

It also includes updated estimates of the cash-flow impact of Government fiscal policies that have been introduced to support businesses. The most important of these for company cash flows is the Coronavirus Job Retention Scheme (hereafter 'CJRS'), which has been extended since the May interim FSR. Bank staff have also made changes

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(2) Throughout this document, 'companies' refers to private non-financial companies of all sizes and 'corporate sector' refers to all private non-financial companies on aggregate.

to improve the modelling framework employed in the May analysis, based on evidence gathered since then. The annex provides more detail on how these have been implemented.

Bank staff have also modelled cash flows for a large number of smaller companies that do not report profit and loss account information

The [August Financial Stability Report](#) contains new analysis of the impact of the Covid-19 shock on small UK companies. This is based on a large new data set that we have compiled from balance sheet information filed by SMEs at Companies House. This annex details a novel and experimental approach to estimating small company cash flows from this dataset using machine learning techniques to estimate the turnover of small companies based on their observable characteristics.

We have used a simpler method to estimate cash-flow deficits for US and euro area companies too

Box 1 describes an exercise that Bank staff conducted to apply the cash-flow deficit analysis to companies in the US and euro area. Data limitations mean that the exercise for other countries uses simpler assumptions and a smaller data set than for UK companies.

2 Changes to cash flow modelling since May

This updated technical annex focuses on the changes to the modelling between May and August

The [technical annex](#) that accompanied the May 2020 interim Financial Stability Report contained explanations of the data and assumptions used to produce the quantitative analysis of UK company cash flows that featured in the report. The remainder of this section of the annex details the changes we have made since May.

Changes to the company-level data set

We have expanded the company-level data set so that it now covers around 95,000 companies

As we set out in May, Bank staff's analysis of UK company cash flows uses a large sample of accounting information on individual UK companies compiled from Companies House and listed company filings. This sample covers a number of profit and loss account, cash flow statement and balance sheet items. We have since expanded the coverage of the data set to include around 10,000 more small companies, primarily those that have only filed profit and loss accounts at Companies House for the latest financial year (which in most cases is 2018-19), taking the number of companies from around 85,000 to around 95,000. We have also updated the accounts for listed companies that have filed more up to date pre-Covid-19 accounting data since May.¹

The data set now contains estimates of potential refinancing needs for companies over the next year

We have also used the company accounting information to prepare indicative estimates of the UK corporate debt that might need to be refinanced over the next year. These estimates are based on accounting variables capturing short-term debt with a maturity of less than a year, and long-term debt and on-balance-sheet leases with a maturity of more than a year but that is due to mature in the next year. Together this data gives an estimate of the total amount of debt that might need to be refinanced in the next year. This suggests that the aggregate refinancing need for the 95,000 companies in our data set is around £275 billion.

The estimates of potential refinancing needs are uncertain

There are a number of reasons why these estimates should be treated as indicative and not precise estimates of refinancing needs:

- The accounting data that we have collected does not definitively identify debt that will reach maturity in the next 12 months.
- Most of the accounting data is from the 2018-19 financial year and so largely refers to debt maturing in 2019.

(1) Given we are modelling the impacts of the Covid-19 shock on UK companies, we have only collected data on trading that occurred prior to the shock. This means in practice that we have not updated the accounting information of any firms that have a financial year-end that is any later than February 2020.

- We cannot identify debt that companies will choose to pay back in full at maturity or take into account debt that is amortising, such that the principal will have been fully paid back by the maturity date.
- Many companies will classify overdrafts and revolving credit facilities that have maturities of greater than a year as short-term debt, given the risk that the debt will not be rolled over. In practice, much of this debt will have longer agreed maturities between borrowers and lenders.

Changes to the macroeconomic scenario

We have updated the turnover shocks that we model, consistent with the central projection for GDP in the August Monetary Policy Report

We model changes in turnover for UK companies in each quarter of the 2020-21 financial year at a sector level. In some cases, we model turnover at more granular sub-sectors. These updated sectoral paths for turnover take into account the latest monthly GDP data for April and May, as well as real-time spending indicators, survey results and intelligence from the Bank's Agents. Consistent with the evidence to date, companies in sectors most affected by the Covid-19-related disruption face the largest reductions in turnover. In aggregate, the updated turnover paths are calibrated to be broadly consistent with the central projection described in the [August Monetary Policy Report](#) (hereafter 'MPR').

Since the Covid-19 outbreak began to have a direct effect on UK households and businesses, demand has fallen sharply. GDP fell by 6.9% in March alone – such that output fell by just over 2% in Q1 as a whole – and in April it fell by a further 20%. Output rose a little in May, and is expected to have recovered to a greater extent in June. But the fall in output in Q2 is expected to have been less severe than was assumed in the May MPR illustrative scenario. Restrictions had been assumed to be gradually unwound between early-June and late-September, but were lifted earlier. Some activity was also a little stronger than expected under lockdown. In the MPR central projection, UK GDP falls sharply in 2020 H1, before recovering in 2020 Q3 and rising further in 2020 Q4. GDP does not exceed its level in 2019 Q4 until the end of 2021.

The turnover shocks we apply vary substantially by sector and we have overlaid real-time payments data on actual sales in 2020 Q2 for some individual companies

We now have outturn data on how sectoral output evolved in the first part of 2020 Q2. This confirms that some sectors, including, for example, arts and recreation and accommodation and food, were more affected by social distancing measures than others, as we expected in May. We have used this data to inform the sectoral turnover paths that we model. We use the ONS input-output analytical tables to ensure that the shocks we apply at sector level are consistent with the forecast paths for the expenditure components of GDP.

For some individual companies we have used real-time payments data – derived from the CHAPS payments system – to estimate how turnover evolved in practice in 2020 Q2. We do this by comparing data on average sales for those companies in 2020 Q2 with 2020 Q1. Where we are able to match these companies to our accounting data, we have used this payments data to model the actual path of turnover in that quarter. This applies to around 80 large companies in the data set.

Minor improvements to assumptions for how companies respond to the shock

Companies continue to pay their operating leases during the shock

We have gathered more granular data on the operating lease expenses of companies. We assume that companies continue to pay their operating leases during the shock. This is consistent with our assumption that companies continue to pay interest on their debts through the shock and with intelligence gathered from companies by the Bank's Agents.

Inventories evolve in line with turnover through the shock, but are less volatile

We now model the dynamics of inventories through the shock. We assume that the inventories recorded on company balance sheets change by a third of the change in turnover each quarter through the shock. For example, if turnover falls by 30% in a given quarter we assume that inventories fall by 10%. Thus, companies run down

inventories to some extent as their turnover drops, especially in 2020 Q2, before building up their inventory again as business picks up in 2020 Q3 and for the rest of the year. These dynamics are consistent with reports from the Bank's Agents that businesses that temporarily shut down are likely to face cash costs on reopening after the relaxation of the formal social distancing measures.

For consistency, we apply an additional assumption that inventories cannot fall by more than total non-labour costs recorded in company accounts (reflecting that inventories include raw materials and intermediate inputs used in production). Overall these assumptions for inventory push back some of the cash flow problems that companies would have faced in 2020 Q2 to later in the financial year.

We now assume that companies that were not investing at a maintenance level before the shock would opt to do so during the shock to maintain their productive capacity

We continue to assume that companies cut capital expenditure to the level of depreciation recorded in company profit and loss accounts. However, we now also assume that companies that were not maintaining their capital stock before the Covid-19 shock do so in our analysis. This implies an increase in capital expenditure for some companies compared to the period immediately before the shock. This change in assumption better supports the interpretation of the results as reflecting a hypothetical scenario where all companies are investing enough to maintain their productive capacity.

Companies facing cash flow difficulties defer their 2020 Q2 rent payments to later in the year

The Government has introduced temporary measures to prevent companies that cannot afford their commercial rent payments from being evicted from their properties. There is some evidence, including from the Bank's Agents, that struggling companies are deferring their rent payments to later in the year. We have assumed that all companies with negative cash flows defer their 2020 Q2 rent payments and repay them in equal instalments over the remaining quarters of the financial year, over and above the rent payments due in those quarters.

Large companies pay corporation tax bills during the quarter in which the liability is accrued

We have refined our assumptions for the timing of corporation tax payments in order to bring them in line with the tax legislation. We now assume that companies with more than £20 million in taxable profit pay corporation tax on those profits each quarter on the basis of expected profits for the quarter. Companies with taxable profits of between £1.5 million and £20 million pay corporation tax in the final two quarters of a financial year and the first two quarters of the next financial year. And smaller companies continue to pay their corporation tax over the nine months after the financial year-end. This makes the analysis consistent with the tax legislation.

Table 1 sets out the assumptions we use to model company cash flows before fiscal policy support.

Table 1 We have updated the calculation we apply to estimate cash-flow deficits before fiscal policy

Assumptions for modelling the implications of the shock for company finances before fiscal policy response

	May assumptions	Updated assumptions	Relaxing the assumption that companies maintain productive capacity, consistent with MPR
Estimated cash-flow deficit at individual company level			
Turnover	Modelled by Bank staff to be broadly consistent with the illustrative May 2020 MPR scenario, with different profiles across sectors and, in some cases, sub-sectors.	Modelled by Bank staff to be broadly consistent with the August 2020 MPR central projection. Adjusted for CHAPS real-time payments data for individual companies where possible.	
minus Operating costs, of which:			
Labour costs	Assume that companies maintain employment, hours and compensation at pre-Covid-19 levels absent furloughing – see description of modelling of Coronavirus Job Retention Scheme (CJRS) in Table 2 below.	Unchanged assumptions.	Assume that companies make redundancies based on a historical company-level ‘Okun’ relationship. ¹ Adjust employment path to take into account the wage subsidy provided by the CJRS and Coronavirus Job Retention Bonus (CJRB). Assume a lower elasticity of furloughing to turnover when companies are making employees redundant.
Property rental costs	Companies continue to pay 100% of property rental costs.	Companies facing negative cash flows in 2020 Q2 defer their property rental costs and smooth them over the remaining quarters of the year.	
Other operating costs	Change in line with turnover, consistent with proportional decline in the use of intermediate inputs (and value-add falling in line with output).	Assume that companies continue to pay operating leases. Other assumptions unchanged.	
minus Other cash flow impacts, of which:			
Interest	Assume companies pay interest on their outstanding debt, taking into account the cuts to Bank Rate during 2020.	Unchanged assumptions.	
Corporation tax	Assume no change in corporation tax rate.	Model exact timings of corporation tax payments in line with tax legislation.	
plus / minus Change in working capital	Trade creditors and trade debtors change in proportion to turnover. Inventories unchanged.	Inventories change by a third of the change in turnover each quarter. Unchanged assumptions for trade creditors and trade debtors.	
Capital expenditure	Cut to a maintenance level equal to depreciation.	Unchanged assumptions.	Assume that companies cut capital expenditure steeply in 2020 Q2 before allowing it to gradually recover over the rest of the year. Path estimated at company level using Decision Maker Panel (DMP) survey data available in July, based on company characteristics.
Dividends / buybacks	Cut to zero, unless company has positive cash flow.	Unchanged assumptions.	
equals Cash-flow deficit before fiscal policy response			

Sources: Bank of England and HM Government

(1) The ‘Okun’ relationship refers to the observed empirical relationship between economic activity and employment.

Changes to the Coronavirus Job Retention Scheme

The Coronavirus Job Retention Scheme allows companies to furlough employees

We continue to assume that companies facing reductions in turnover will furlough some of their employees and claim compensation as part of the CJRS. This allows those companies to reduce their labour costs without reducing employment, contractual hours or wages. Since our analysis in May, furloughing of employees has happened on a large scale, with a cumulative 9 million jobs furloughed under the scheme. We retain the assumption from May that there is a reduction in turnover per employee – a measure of productivity – whilst the CJRS is in place, so companies can only reduce the size of their workforce through furloughing by around 70% of the turnover shock that they face in 2020 Q2.

The CJRS has been extended to the end of October

We assume that all companies facing reductions in turnover make use of the CJRS whilst it is in operation. The Government announced in May that the scheme would be extended until the end of October. This means that the scheme now helps companies to reduce labour costs for the entirety of 2020 Q3 and part of 2020 Q4, as well as 2020 Q2.

Companies are now required to make employer contributions to help cover the compensation of furloughed employees under the extended CJRS

Alongside the extension of the CJRS, the Government announced that companies will be required to make contributions towards the pay of furloughed employees. At the same time, the Government's contribution will now be reduced by the same amount. In September companies will be required to pay 10% of the wages of furloughed employees up to £312.50 per month. In October they will pay 20% of wages up to £625 per month. From August until the end of the scheme, companies will be required to pay employer National Insurance contributions (NICs) and the employer pension contributions of furloughed employees. Some companies report data on the average employer NICs and pension contributions that they pay as part of their company accounts. If companies do not report this data we assume that it amounts to 15% of wages of furloughed employees, which is consistent with average employer NICs of 12% of wages and an average pension contribution of 3%.

We assume that all companies furloughing employees make these mandatory contributions. We continue to assume that companies with cash-flow deficits would not opt to top up the pay of furloughed employees on top of the amounts specified in the scheme. If those companies did opt to top up the wages of furloughed employees this would increase the size of the cash-flow deficit that we estimate.

The CJRS now allows companies to furlough employees on a part-time basis

From July onwards the Government has made it possible for companies to bring furloughed employees back to work for any amount of time and any shift pattern. The employer and Government contributions under the scheme are proportional to the hours not worked. Companies bringing back one person on a full-time basis or two people with the same salary on a half-time basis would impact their labour costs in the same way. Given that it is labour costs rather than their allocation that matters for our analysis, an assumption that companies choose to make use of this new feature of the scheme would not mechanically affect our estimates of the impact of the CJRS on company cash flows.

There is evidence that employees that have been furloughed tend to have lower wages than the average employee within their companies or sectors

The CJRS has been in operation for several months and there is an increasing amount of evidence of how the scheme has worked in practice. This includes survey data collected from the perspective of employees, households and businesses, as well as administrative data on recorded claims under the scheme. One of the facts that has emerged is that the employees being furloughed appear to have lower wages than the averages in their sectors. This is reflected in the average claims under the scheme, which stood at around £2,000 per job furloughed in the latest HMRC statistics. It is confirmed by household survey data from the Understanding Society Covid-19 survey.

Our approach for the May interim FSR assumed that companies would furlough employees earning the average wage in their organisation, which might have led us to overstate the impact of the CJRS on labour costs. To adjust

for this, we now assume that companies furlough employees that earn 70% of the average wage within their companies. This is calibrated to roughly match the evidence in the HMRC statistics¹ and survey data.

Table 2 sets out the assumptions we use to model fiscal policy support.

Table 2 We have changed some of our assumptions for how fiscal policy affects company cash flows

Assumptions for modelling the implications of the shock for company finances after fiscal policy response

	May assumptions	Updated assumptions	Relaxing the assumption that companies maintain productive capacity, consistent with MPR
Estimated cash-flow deficit before fiscal policy response			
<i>plus</i> Coronavirus Job Retention Scheme (CJRS)	Estimate number of furloughed employees proportional to 75% of the fall in turnover over the period of the shock. 25% of the fall in output is explained by a fall in turnover per employee. Assume companies do not pay ('top up') the remainder of labour costs of furloughed employees.	Extension of the CJRS to the end of October, mandatory employer contributions and employees furloughed earn 70% of the average wage within their company. Unchanged assumptions for the furlough decision and topping up.	Assume a lower elasticity of furloughing to turnover when companies are making employees redundant.
<i>plus</i> Business rates relief and cash grants for certain sectors	Estimate 'rateable value' – the commercial rents measure to which business rates apply – for companies in eligible sectors to estimate eligibility.	Unchanged assumptions.	
<i>plus</i> VAT cut	Announced post-May, so not modelled.	Assume 80% pass through to consumer prices for temporary VAT cut in eligible sector, consistent with MPR.	
<i>plus</i> Coronavirus Job Retention Bonus (CJRB)	Announced post-May, so not modelled.	Assume all companies that furloughed employees claim the £1,000 bonus per employee rehired.	Assume that all employees made redundant were previously furloughed.
<i>plus / minus</i> VAT deferral	Estimate current VAT receipts and payments. Assume lag between cash inflow and cash outflow when company pays HMRC for liabilities due in 2020 Q2.	Unchanged assumptions.	
equals Cash-flow deficit after fiscal policy response			

Sources: Bank of England and HM Government

Modelling of Government policies introduced since May

We assume that the temporary VAT cut is not fully passed through to consumers

In July, the Government announced a reduction in the rate of VAT from 20% to 5% for supplies of food and non-alcoholic drinks from restaurants, pubs, bars, cafés and similar premises, accommodation and attractions. In line with the conditioning assumption underpinning the MPR central projection, we assume that 80% of this VAT cut is passed through to consumer prices. The remaining 20%, therefore, boosts the profits and cash flows of companies in those sectors. We assume the benefit is evenly distributed across all companies in the sectors during 2020 Q3 and 2020 Q4.

(1) See [here](#) for the statistics.

We have modelled the impact of the Coronavirus Job Retention Bonus in providing cash-flow support to companies that retain employees they have previously furloughed

The new CJRB pays companies to retain employees that were previously furloughed. It pays a one-off bonus of £1,000 for every employee earning above £520 per month that is brought back after a period of furlough and remains employed to the end of January 2021. In the variant of the cash-flow projection in which we relax the assumption that companies maintain productive capacity including pre-Covid-19 employment levels (see below for alternative assumptions), we have assumed that any employee who is made redundant was previously on furlough.

That means that if a company is making 3% of its workforce redundant in our analysis, having previously furloughed 20% of its workforce in 2020 Q2, they receive the CJRB payment for 17% of its employees in 2021 Q1. We also model the potential impact that the CJRB can have on companies' decisions to rehire workers (see below). In the scenario where we assume that companies maintain productive capacity all furloughed employees are rehired.

Exploring sensitivity to the assumption that companies maintain productive capacity

We have considered how the cash-flow deficit estimates would change under an assumption that companies do not opt to maintain productive capacity at pre-Covid-19 levels

As in May, the cash-flow projections condition on an assumption that companies seek to maintain their productive capacity at pre-Covid-19 levels, as recorded in the latest accounting data they have reported. Maintenance of productive capacity is assumed to include maintaining employment, hours worked and wages at pre-Covid-19 levels and maintaining the pre-Covid-19 capital stock, including property and equipment by setting capital expenditure to offset depreciation that would otherwise occur. This was designed to provide an indication of the amount of finance that the corporate sector might need to weather the economic disruption, while minimising damage to output and employment as much as possible.

In the [August FSR](#), we also present an estimate of the cash-flow deficit where employment and capital expenditure evolves broadly consistently with the aggregate employment and business investment projections underlying the August MPR central projection. This gives us a set of estimates for company cash flows that more closely aligns with how companies may choose to respond to the shock in practice.

Many companies expect their capital expenditure to fall below maintenance levels in the near term, before recovering gradually

Our assumption that companies maintain productive capacity implies that all companies keep capital expenditure at a level that is sufficient to cover depreciation of their existing capital stock. We proxy for this on the basis of the depreciation that is recorded in companies' accounts. This implies a cut in capital expenditure of around 20% on aggregate for companies in our sample. It also implies constant capital expenditure over the next year. However, there is evidence that many companies plan to depart significantly from this simple assumption in reality.

The MPR reports that business investment is expected to have been 40% lower in 2020 Q2 than at the end of 2019. Intelligence from the Bank's Agents also suggests that companies have cut investment spending significantly, with some reports of investment being redirected to finance social distancing measures and facilitate remote working. The Deloitte survey of CFOs published in July suggested that 65% of CFOs expect to cut capital expenditure this year. The Decision Maker Panel survey (henceforth 'DMP survey') asked companies how they expect Covid-19 to affect their capital expenditure in each of the next four quarters. Their responses implied steep cuts in capital expenditure in 2020 Q2, followed by a gradual recovery over the rest of the year and into 2021 Q1.

We have relaxed the assumption that companies invest at a maintenance level, using company-level evidence on capital expenditure expectations from the DMP survey

We have run a variant of our analysis that models a profile for capital expenditure over the 2020-21 financial year that is more consistent with the body of evidence on company investment plans. We used company-level data from the waves of the DMP survey that asked companies about the impact of Covid-19 on their capital expenditure. We

conducted simple cross-sectional regressions to estimate the correlation between capital expenditure expectations and factors like a company's sector, current period sales expectations, future sales expectations and productivity.

These regressions suggested that companies in different sectors have large differences in capital expenditure expectations and that capital expenditure expectations were strongly positively correlated with current period sales expectations, whilst other variables were not statistically significant. The waves of the DMP survey that asked about both capital expenditure and sales expectations did not ask companies about their subjective sales uncertainty, so we could not use uncertainty as a control variable. It is therefore possible that the coefficient on the current period sales expectations variable was picking up variation in uncertainty and other omitted factors like financial constraints.

We used the estimated coefficients from these regressions to compute predicted paths for capital expenditure at company level on the basis of these observable characteristics. The resulting aggregate path for capital expenditure implied by our analysis is broadly consistent with the path for business investment in the August MPR central projection. But this masks considerable company-level heterogeneity, with companies in sectors like healthcare with positive sales growth expectations projected to have an increase in capital expenditure throughout the 2020-21 financial year. This analysis implies that in aggregate companies increase their capital expenditure above maintenance levels in the second half of the year.

There has probably already been a reduction in employment and many companies expect to reduce the size of their workforce through redundancies in the coming year

The conditioning assumption that companies maintain productive capacity also implies that they will not reduce employee numbers or cut hours or wages. We model this by assuming that companies' labour costs remain unchanged at pre-Covid-19 levels apart from the reduction in labour costs that comes with furloughing employees under the CJRS. This assumption resulted in labour costs falling – albeit by less than turnover falls – during the months in which the CJRS is in place, before rising back to pre-Covid-19 levels when the CJRS ends.

There is mounting evidence that companies have already responded to the shock by cutting the size of their workforce, over and above furloughing. According to HMRC Pay As You Earn (PAYE) data, the total number of employees fell by 2% in the three months to June, equivalent to over half a million fewer employees. Evidence from business surveys, including the DMP survey, suggests that companies expect Covid-19 to reduce the size of their workforces somewhat beyond 2020 Q2.

We have modelled a relationship between turnover and employment at company level, to reflect that companies facing the largest turnover shocks are most likely to cut the size of their workforce

Consistent with the evidence on companies cutting employment, we have run a variant of the cash flow analysis that assumes a relationship between turnover shocks and employment at company level. Using a historical data set of company accounting data covering a large sample of around 30,000 UK companies since 2005, we calibrated these coefficients at sector level by estimating the historical relationship between (log) changes in turnover and (log) changes in employment.

More specifically, we ran panel regressions that controlled for firm, sector and year fixed effects, as well as firm characteristics including total assets, changes in labour costs per employee and lagged changes in turnover. These regressions pointed to a strong positive correlation between turnover and employment changes in the historical data. This correlation varied significantly by sector in this data. We used the coefficient estimates from these regressions to predict company level changes in employment conditional on a given change in turnover through the Covid-19 shock.

This analysis was conducted on an annual basis as UK companies do not typically report quarterly accounting data.¹ It is possible that the relationship between turnover and employment changes is stronger at an annual than a quarterly frequency because hiring and firing costs likely lead companies to 'look through' quarterly volatility in turnover. To address this source of bias, we applied the coefficients to the four quarter moving sum of turnover,

(1) As detailed in the technical annex to the interim Financial Stability Report in May, in order to produce quarterly projections of cash flows, we have simply divided the annual turnover and cost accounting data by 4, assuming that revenues and costs are distributed evenly across a full year.

which in each quarter would incorporate an additional quarter of turnover information in our cash flow analysis. It is also likely that these regressions suffered from issues like omitted variable bias and reverse causality given the complex relationship between turnover and employment in the real world, so this exercise should be interpreted as an indicative attempt at mapping from turnover shocks to employment.

The change in employment that is implied by this exercise should be interpreted as cost-cutting measures that companies take, commensurate with a persistent reduction in their turnover. The regressions only include surviving companies, so do not reflect job losses that arise through firm failure. Employment loss arising from company distress would be additive to the employment reductions we model for surviving companies.

The wage subsidy that is paid to companies through the CJRS will dampen the relationship between turnover and employment, reducing job losses whilst the CJRS is in place

The CJRS can be thought of as a form of wage subsidy that is paid to companies that retain their employees instead of laying them off. It incentivises companies to reduce employees' hours, so that labour costs fall whilst headcount does not. The CJRS should lead companies to reduce the size of their workforce by less than they would in the absence of the scheme.

We have directly estimated the size of this wage subsidy by multiplying the compensation paid by the Government under the scheme by the proportion of employees furloughed at company level and then scaling by the average wage of furloughed employees relative to the average within the firm. Interpreting this wage subsidy as a shock to wage costs allowed us to re-estimate the employment paths that our historical regressions (which include a labour cost term) implied, taking into account the impact of the CJRS on employment. The result is that company-level employment was substantially higher in our analysis whilst the CJRS was operating than it would have been in its absence. This finding is supported by evidence on how employment has evolved to date.

We have also modelled the impact of the wage subsidy provided through the CJRB. The CJRB provides cash support to companies that choose to retain employees beyond end-January 2021 that were previously furloughed. This also pushes up on employment somewhat.

We assume that companies reduce their labour costs partly through furloughing under the CJRS and partly through redundancies

The assumption that companies reduce employment through the shock leads us to adjust the elasticities we apply to calculate the number of employees furloughed. We assume that companies target lower labour costs in response to the turnover shock, which can be achieved partly through furloughing and partly through redundancies. That companies would choose to make redundancies despite the CJRS is consistent with evidence from the DMP survey that many companies do not expect their turnover to have recovered to pre-Covid-19 levels at the time the CJRS is due to end.

DMP survey evidence also suggests that the furloughing elasticity is likely to decline as the level of support offered through the CJRS phases out and employer contributions phase in. In practice, we capture this by gradually reducing the furloughing to turnover elasticity from around 70% in 2020 Q2 to 45% in 2020 Q3 and 20% in 2020 Q4. This is broadly consistent with the central projection for furloughing in the August MPR and evidence from the DMP survey on companies' plans. This adjustment serves to shift some of the labour cost reduction from furloughing to redundancies as the wage subsidy provided through the CJRS is reduced over time. The effect of this on employment is partly offset by the gradual recovery in turnover from its trough in 2020 Q2.

The resulting employment path is broadly consistent with the MPR central projection

This approach gives us an implied aggregate path for employment for all of the surviving companies in our company accounting data set. The reduction to employment relative to pre-Covid-19 levels peaks at around 3%, which is broadly consistent with the MPR central projection once some allowance is made for the likelihood that distressed companies are likely to cut employment by more. Note that the read across from the company-level data to the aggregate paths in the MPR central projection is not direct, given compositional differences within and across sectors and the poor coverage of smaller companies, sole-traders and partnerships in our company-level data.

There may be upside risks to the labour costs profiles that we model at company level in this analysis. In particular, we have not modelled any reduction in hours or wages for employees that are not laid off through the shock, which would be an alternative means for companies to reduce their labour costs. This is particularly uncertain, but there is some evidence that the wages of employees in some companies have been cut, at least temporarily.

Box 1 Covid-19 and corporate sector financing in the US and the euro area

Bank staff have also modelled how the Covid-19 shock might affect company finances in the US and EA

To complement the estimates of the cash-flow deficits UK companies might face from Covid-19, Bank staff have extended this analysis to US and euro area (hereafter 'EA') companies. The method used to produce these estimates is similar to that in the UK analysis, with some simplifying assumptions reflecting more limited data availability. This accounting exercise projects cash flows over the 2020-21 financial year for a sample of US and euro area companies by applying a shock to their turnover. The shock is based on a macroeconomic scenario that is broadly consistent with the projections set out in the August MPR, with the turnover shocks varying significantly by sector. The modelling also makes simple assumptions for how companies might adjust their costs and other cash flow items. As in the UK analysis, the resulting 'cash-flow deficit' is the sum of all negative cash flows across all companies in the sample.

We use a company-level data set for the US and euro area compiled from listed company filings

The analysis of US and EA company cash flows uses available accounting information on individual companies compiled from listed company filings using S&P Capital IQ data. The sample is significantly smaller than that used in the UK modelling, comprising around 4,000 companies in the US and around 1,500 in the euro area (made up of a sample covering the 4 largest euro area economies – Germany, France, Italy and Spain). As a result, the data set we are able to use for this exercise is relatively limited, and is weighted towards larger companies.

Companies face a sector-specific turnover shock over the next year, and respond with actions that reduce their costs and expenditure

We model turnover shocks for US and euro area companies for the 2020-2021 financial year as a whole. The shock to turnover is based on the projections for US and EA GDP set out in the August MPR. US and EA GDP are projected to fall by 5¾ and 8% respectively, as GDP falls sharply in 2020 Q2 before gradually recovering over the second half of the year. GDP remains below pre-Covid-19 levels in 2021 Q1. As in the UK, companies in sectors most affected by Covid-19 face the largest reductions in turnover. The sectoral shocks underlying our modelling are based on the UK estimates for sectoral disruption, adjusted by the relative size of the macroeconomic shock in the US and EA.

We model a range of assumptions for company costs, reflecting data limitations

In response to the shock, companies are assumed to reduce costs and cut back on other expenditure. We assume companies maintain employment, hours and compensation at pre-Covid-19 levels, but that other operating costs change in line with turnover. We do not have full data on the composition of companies' operating costs, so make assumptions for the split of labour and non-labour costs. To capture the uncertainty around these, we produce a range for the size of the cash-flow deficits. At the upper bound, non-labour costs are assumed to make up around half of companies' costs. In the lower bound estimates they are assumed to make up around 70% of costs.¹ Companies also adjust other cash flow items. Capital expenditure is cut significantly, to a maintenance level equal to depreciation, while dividends and buybacks are cut to zero. As a simplifying assumption, we assume tax and interest payments are unchanged from pre-Covid-19 levels.

We assume that companies maintain their productive capacity through the shock

The assumptions we make for employment and investment are consistent with companies maintaining productive capacity. Changing these assumptions would affect our cash-flow deficit estimates materially. For example, our cash-flow deficit estimates would be smaller if we assumed companies reduce employment in response to the shock. And they would be larger if companies cut capital expenditure by less than our assumption that it is reduced to only cover depreciation costs. Reflecting the more limited data available to us, we do not attempt to estimate the potential offsetting impact of policies that support corporates.

(1) The non-labour cost shares used in our lower bound estimates are broadly in line with estimates obtained from the UK company level data. At the upper bound we assume the economy-wide labour share (around 2/3 in the US and EA) applies to the available data on firm costs.

3 Cash-flow deficit estimates for smaller companies

Smaller companies are not well-represented in the granular company accounting information used to project companies' cash flows in Section 2

The analysis of company cash flows set out in Section 2 of this annex uses granular accounting data derived from the profit and loss accounts of UK companies. However, that data set has very low coverage of smaller companies that have less than £10 million in turnover. They generally do not file profit and loss accounts. This section describes an alternative approach to estimating the cash-flow impacts of the shock for those companies.

Companies with less than £10 million in turnover account for a quarter of total turnover and almost half of total employment in the UK economy

There are around 5.8 million small businesses in the UK, representing more than 95% of the total business population of 5.9 million (**Table 3**). This includes 3.5 million sole proprietorships and 400,000 ordinary partnerships. Based on a broad definition that includes all companies with fewer than 250 employees, smaller businesses make up around 45% of total UK turnover and around 60% of total UK employment in the private sector. Within this, companies with less than £10 million in turnover make up 25% of UK turnover and almost half of UK employment.

Table 3 sets out the turnover, employment and number of businesses accounted for by companies with less than 250 employees in the UK business population.

Table 3 Active companies account for a large share of the employment and turnover of UK SMEs

The population of UK SMEs^(a) and all companies according to the Business Population Estimates

Type of SME	Total turnover (£ million)	Total employment (thousands)	Number of businesses
Sole proprietorships	165,487	4,168	3,490,120
Ordinary partnerships	91,224	1,559	404,850
Companies with <250 employees	1,655,992	10,894	1,965,120
UK private sector ^(b)	4,149,973	27,498	5,867,770

Sources: Business Population Estimates; Bank of England; Bank calculations.

(a) In this table SMEs refers to companies with fewer than 250 employees and includes companies from all sectors. The Business Population Estimates do not split out businesses by turnover brackets.

(b) The sources used to produce the Business Population Estimates exclude non-UK turnover and operations from the turnover data.

There are a range of different definitions of SMEs – we focus this analysis on small companies with less than £10 million in turnover, which are not legally required to report information on turnover and costs

There is no widely-accepted definition of what constitutes an SME. The European Union defines SMEs as companies with fewer than 250 employees, whilst the US authorities typically refer to companies with fewer than 500 employees. The bank capital regime refers to a turnover cut off of €50 million. Within that, SMEs that fall under retail banking generally have turnover of less than €1m and no client management relationship.

For the purposes of the analysis presented in this annex – and the August Financial Stability Report – we focus on small companies with less than £10 million in total turnover. This captures those registered companies that do not typically file profit and loss account information at Companies House.¹ This is at the smaller end of the spectrum of definitions of SMEs and likely covers around £750-800 billion in total UK turnover, which compares to £1.25 trillion under the broader definition based on companies with fewer than 250 employees.² For this reason, we will refer to these smaller SMEs as 'small companies'.

Producing a data set of balance sheet information on small companies

We have compiled a large new data set containing balance sheet items for small companies

We have developed a dataset on small companies using data collected from Companies House via Fame (Bureau van Dijk). This dataset covers those companies that are not legally obliged to file profit and loss accounts at

(1) The reporting criteria for Companies House depend on company size, with less onerous reporting requirements for smaller companies and micro-entities. Small companies (micro-entities) can opt to file only abridged (micro-entity) accounts if they fulfil at least two of the following criteria: a turnover of £10.2 million (£632,000) or less; £5.1 million (£316,000) or less in assets on balance sheet; 50 (10) employees or less.

(2) These totals exclude financial and public companies.

Companies House, and which are not, therefore, well-represented in the cash-flow deficit modelling for larger companies discussed in Section 2 of this annex.¹

There are around 2 million small companies that file some balance sheet information at Companies House. This includes information on their fixed assets, current assets, non-current liabilities, current liabilities and equity. The companies that classify as small companies – as opposed to micro entities – also report other more detailed balance sheet data such as the value of working capital items. The data contains information on the sector in which all companies operate. We have downloaded all available balance sheet data on all active companies over the 2017-18 and 2018-19 financial years, excluding those that report profit and loss account information, which were included as part of the cash-flow projections for larger companies described in Section 2.

Filtering out financial and public companies and consolidating accounts at group level gives us a total sample of 1.5 million small companies for our analysis

We apply a number of filters to the sample of 2 million small companies before we include them in our final data set for analysis. This includes filtering out companies that are either financials or state-owned companies, consistent with our overall focus on private non-financial companies. We also avoid double counting of financial information by consolidating company accounts by their ultimate owner. And we exclude any companies that have not filed accounts in each of the past two financial years.² These steps combined leave us with a sample of 1.5 million companies for our analysis, covering an estimated £650 billion in total turnover, compared to a universe of around £750-800 billion for these companies in the UK business population.

Table 4 provides summary statistics on these 1.5 million small companies.

Table 4 The new small company data set we have compiled covers key balance sheet items

Summary statistics for key variables^(a)

£ thousands	Description	25 th percentile	Median	75 th percentile	90 th percentile
Total assets	All financial and non-financial assets	11.8	47.9	216.0	846.2
<i>Per cent of total assets</i>					
Long-term debt	Debt due after more than one year	6.6	19.6	43.4	71.8
Short-term debt	Debt due after within one year	3.1	12.9	44.4	99.7
Total debt	Current and non-current debt liabilities	6.8	26.1	61.7	105.9
Accounts payable (trade creditors)	Amounts due to vendors and suppliers	1.8	7.7	21.8	43.9
Shareholders' equity	Net worth of company	0.8	28.9	66.7	90.5
Cash	Cash at hand and in bank	6.3	28.4	68.6	96.1
Inventory	Inventory of finished goods, work in progress and raw materials	3.4	12.7	36.3	71.1
Accounts receivable (trade debtors)	Claims for payment on goods supplied and services rendered	5.8	18.5	38.5	60.2

Sources: Fame (Bureau van Dijk); Bank calculations.

(a) Some variables are reported as missing in our data. In some cases this is because companies do not legally have to include these variables in the accounts they file at Companies House, for example because micro entities can file abridged balance sheet information. This applies particularly to long-term debt, short-term debt and working capital variables.

(1) The analysis conducted in section 2 did include around 74,000 companies that file profit and loss accounts and have less than £10 million in turnover. They account for £10 billion of the total estimated cash-flow deficit in that sample this financial year.

(2) This step meant we removed a number of very young companies from the analysis. This was necessary given that our approach involves calculating certain 'flow' variables by measuring changes in certain stock variables between financial years.

The new data set significantly expands our coverage of the UK business population

We estimate that the 1.5 million small companies in our sample account for around £650 billion in total turnover.¹ This significantly expands the implied coverage of our company-level accounting data. The original data set based on profit and loss accounts covered only 6% of total turnover for UK companies with turnover of less than £10 million. The coverage of an additional £650 billion in turnover increases our implied coverage of those companies from 6% to around 74% (**Table 5**).

Table 5 The new data set significantly broadens our coverage of private non-financial companies

Turnover of companies in our sample and in the Business Structure Database (BSD)^{(a) (b)}

Turnover bracket	Turnover in the sample (£ mn)	Turnover in BSD (£ mn)	Ratio of the sample to UK enterprise population
≤ £10 million			
Companies that report P&L data	59,048	944,400	6%
Companies that report only balance sheet data ^(c) (new data set)	644,546		68%
£10-45 million	289,477	417,800	69%
£45-250 million	505,545	590,600	86%
£250-500 million	253,723	282,900	90%
> £500 million	3,086,206	1,893,000	163%

Sources: Bank of England; Fame (Bureau van Dijk); ONS; S&P Capital IQ; Bank calculations.

(a) The BSD data is at enterprise level and does not include non-registered sole traders. These are covered in more detail in a box in the FSR.

(b) This was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research data sets which may not exactly reproduce National Statistics aggregates.

(c) The turnover of these companies has been estimated using a machine learning algorithm, tuned to match the UK business population excluding zero employee companies.

Imputing profit and loss account and cash flow items for small companies

We employed a novel and experimental machine learning approach to estimate turnover for the large sample of small companies that only file balance sheet information

The small companies in our new data set do not report information on their turnover and only around half of them report total employees. To model their cash flows through the Covid-19 shock we needed information on turnover and employees as a starting point. To address this data gap, we used a machine learning algorithm to estimate company-level turnover and employees for each company as a function of other observed characteristics like their total assets and the sector in which they operate.

The gradient boosting model was trained on the sample of companies for which we have complete data

We used a gradient boosting model – which is a machine learning technique that is well equipped to deal with missing values – to estimate the relationship between turnover and a range of company-level characteristics. We assumed that turnover has a gamma distribution and employees a Tweedie distribution in the cross section.² The model was ‘trained’ on the sample of companies for which we have both profit and loss account and balance sheet data and which was included in the cash flow projection for larger companies. For the training sample, we did not consolidate companies by ultimate owner, in order to increase sample size.

‘Training’ involved using the data we have on those companies to estimate turnover and employees as a function of other variables. The algorithm optimises variable selection and the functional form of the model. It uses an iterative process to identify the optimal variable to add to the model at each stage, based on residuals from the previous model that has been run.

We tuned the model to broadly fit the distribution of turnover and employees across the population of small UK companies according to the Business Population Estimates

(1) The gap between this and the £750 billion turnover total for companies in this turnover bracket is almost entirely accounted for by the exclusion of companies that have only reported one year of accounts.

(2) The Tweedie distribution allows for a spike in the number of employees close to zero, which captures the large number of companies with one employee in the population. A gamma distribution is smoother but it does not include zeroes or negative values.

We prevented over-fitting on the training sample – which would limit out of sample performance by allowing the model to fit the training sample ‘too well’ – by running more than 25 different models with a range of parameters. We picked the model with the smallest residual deviance that broadly matched the distribution of UK companies in the business population. This left us with a model that we used to estimate turnover and employees as a function of variables like cash, retained earnings, total assets and a company’s sector. We cross-checked the resulting distributions against other sources of information on the UK business population.

We also imputed a number of other profit and loss account and cash flow variables, including labour costs, interest payments, depreciation and dividends

In order to model cash flows at company level through the shock, we needed estimates of other variables in addition to turnover and employees. This included variables like labour costs, interest payments, depreciation and dividends. To impute these variables we used a simple approach that mapped across from the training sample described above. We carried out this imputation by assuming that the company accounts matched average ratios of these variables to turnover, employees and assets across the training sample within sector and firm size groups.

We used accounting identities to produce a set of estimates of free cash flows before the shock

To fill in our final estimates of free cash flows at company level we estimated small company profitability based on the year-on-year change in retained earnings in the most recent balance sheet data. We added back an estimate of dividends to compute net profit. To this, we added imputed depreciation, an assumed rate of corporation tax and imputed interest payments to estimate EBITDA. We used balance sheet data on the change in working capital and the change in tangible assets net of depreciation to produce an estimate of free cash flows for all companies.

Given the significant uncertainty involved in imputing cash flows, we produced a range of results by applying standard deviations around the key parameter values

The steps involved in estimating cash flows for the small companies in our new data set, particularly the machine learning algorithm and the imputed profit and loss and cash flow items, create a significant degree of uncertainty around the analysis that relies on them. The uncertainty stemming from this process means that the imputed data will be subject to considerable measurement error, on top of any uncertainty around the assumptions we apply to model cash flows through the shock, which also applies to our analysis of larger companies.

To reflect this uncertainty, we produced a range of cash flow estimates by applying standard deviations around the imputed data to produce plausible upper and lower bounds on the results of our analysis. We also tested alternative versions of the machine learning algorithm that gave us different implied turnover distributions across companies. These ranges are presented in the August FSR ‘UK corporate sector and Covid-19’ chapter.

Estimating cash-flow deficits for small companies

We estimate the cash-flow deficit that the turnover shock creates for small companies, under the assumption that companies maintain their productive capacity through the shock

We have used the imputed cash flow data to project cash flows and compute the cash-flow deficits of small companies. We assume that small companies maintain productive capacity through the shock. We have very little evidence of how small companies may adjust employment and capital expenditure over the next year, so we have not attempted to relax this assumption in the same way that we did for larger companies.

Most of the assumptions that we apply to model small company cash flows – including the sector-by-sector turnover paths – are the same as for larger companies, described in some detail in Section 2 of this annex and the [technical annex](#) to the May interim FSR. This section describes only the areas where we make significant departures from those assumptions, which either result from data limitations or reflect judgements that small companies may behave differently to larger companies.

Table 6 sets out the assumptions we apply to model small company cash flows.

Non-labour costs fall by less than turnover during the shock for small companies

We assume that non-labour costs are slower to adjust for small companies than for larger companies. This is consistent with evidence collected from historical company accounting data, which suggests that small companies may be less able to reduce costs in response to a turnover reduction than larger companies.¹ This could reflect factors like lower bargaining power with suppliers or a greater reliance on costs that are difficult to renegotiate or adjust over time, such as advanced stock orders, insurance premiums, operating leases and property rents. Of these items, we impute data on property rental costs but we cannot accurately estimate the others.

We assume that property rental costs are fixed for small companies and that other non-labour costs change by 85% of the turnover shock that small companies face in a given quarter. If our imputation of property rental costs is subject to measurement error this may be reflected in the relative fixity of costs for small companies, given that rents are likely to make up a higher share of non-labour costs for small companies compared to large companies. This assumption is highly uncertain so we tested variants of the analysis under different assumptions for the evolution of non-labour costs. The results fell within the broad range that we present in the chapter.

There is no change in inventories, corporation tax or interest payments

We make several other simplifying assumptions in our analysis of small company cash flows because of data limitations. We assume no change in inventories through the shock. Most small companies do not report data on inventories so we assume no cash flow impact through this channel. This means that deficits could be slightly higher in 2020 Q2 than they would be if we were able to model more realistic inventory dynamics, but lower in 2020 Q3 and beyond. We also assume no change in corporation tax or interest payments through the shock, given uncertainty around the imputed data. These simplifying assumptions are likely to have a very small impact on cash-flow deficits.

We assume that small companies continue to invest at the same rate as before the shock

As for larger companies, we assume that small companies maintain their productive capacity through the Covid-19 shock. However, the data we have on depreciation for small companies is highly uncertain because few small companies report this information in their accounts. We therefore assume that companies keep capital expenditure fixed at its pre-Covid-19 level. To test the importance of this assumption, we ran a sensitivity check that reduced capital expenditure to zero for all small companies. This reduced the aggregate cash-flow deficit estimate by around £5 billion, a relatively small proportion of the total. In general, small companies invest less than larger companies so the capital expenditure assumption we apply is less material in driving results.

The CJRS and SEISS allow companies to reduce their labour costs as turnover falls

We model the impact of the CJRS in reducing labour costs for small companies. The assumptions we apply are the same as for larger companies, although the results are significantly more uncertain given potential measurement issues around the imputation methods we use to estimate employees and labour costs.

We have made an adjustment to the way we model the CJRS for small companies to reflect that companies with very few employees are unlikely to be able to furlough large proportions of their workforce. For example, a small company with two employees facing a 30% reduction in turnover is unlikely to be able to furlough one of the two employees without turnover falling further. We assume that small companies do not furlough employees on a part-time basis. We apply the elasticity between furloughing and turnover and then round the implied number of employees furloughed down to the next whole number of employees. Companies with fewer employees therefore reduce labour costs by less than companies with more employees in our analysis. This is consistent with HMRC evidence that shows that companies with 4 employees or fewer have furloughed a smaller proportion of their workforce than larger companies.

Some small companies may have taken Self-Employment Income Support Scheme (SEISS) payments to help pay their labour costs too. This is likely to be more important for small companies than for larger companies, given that

(1) We ran a historical regression of annual non-labour costs on turnover (in logs) and a number of controls, including company and year fixed effects. We split the sample into small and large companies. The positive and significant coefficient estimate for the non-labour costs variable was larger for large companies than small companies, suggesting that large companies were generally more able to reduce their non-labour costs with turnover historically.

the incidence of self-employment is much higher among small companies. Others may have taken advantage of the time to pay scheme to push back PAYE and other tax payments. Given that our analysis models the CJRS as a simple reduction in labour costs, it can be thought of as a proxy for the impact of other policies in helping small companies to reduce their labour costs. We have run sensitivity checks on the assumptions we apply to proxy for these policies and the range of results reflected in the chapter reflects the uncertainty.

We model the impact of the CJRB, temporary VAT cut, VAT deferral, business rates relief and cash grants in supporting small company cash flows too

Small companies have access to a range of other fiscal policy measures that will support their cash flows through the shock. We have modelled the CJRB, VAT cut, VAT deferral, business rates relief and cash grants policies for all of the small companies in our sample. We use the same methodology as for larger companies, but small companies benefit more from several of these policies given that they are over-represented in sectors receiving some of the support, and given that the cash grants explicitly target small companies. As in the case of larger companies, our data set is not well-suited to conducting a full fiscal costing and we have not attempted to do so. Instead, we have aimed to capture the impact of these policies on our estimate of companies' cash-flow deficits as best we can, given the limitations of the data.

Table 6 We use a simpler method to calculate post-shock cash-flow deficit for small companies

Assumptions for modelling the implications of the shock for small company finances

Assumptions for small company analysis	
Estimated cash-flow deficit at individual company level	
Turnover	Modelled by Bank staff to be broadly consistent with the August 2020 MPR central projection.
<i>minus</i> Operating costs, of which:	
Labour costs	Assume that companies maintain employment, hours and compensation at pre-Covid-19 levels absent furloughing – see Coronavirus Job Retention Scheme (CJRS) row below.
Property rental costs	Companies continue to pay 100% of property rental costs.
Other operating costs	Change by 85% of the change in turnover, consistent with proportional decline in the use of intermediate inputs (and value-add falling in line with output).
<i>minus</i> Other cash flow impacts, of which:	
Interest	Assume companies pay interest on their outstanding debt.
Corporation tax	Assume no change.
<i>plus / minus</i> Change in working capital	Trade creditors and trade debtors change in proportion to turnover. Inventories unchanged.
Capital expenditure	Assume no change.
Dividends / buybacks	Cut to zero.
equals Cash-flow deficit before fiscal policy response	
<i>plus</i> Coronavirus Job Retention Scheme (CJRS)	Estimate number of furloughed employees proportional to 75% of the fall in turnover over the period of the shock. 25% of the fall in output is explained by a fall in turnover per employee. Assume companies do not pay the remainder of labour costs of furloughed employees. Assume that companies do not furlough employees on a part-time basis.
<i>plus</i> Business rates relief and cash grants for certain sectors	Estimate 'rateable value' – the commercial rents measure to which business rates apply – for companies in eligible sectors to estimate eligibility.
<i>plus</i> VAT cut	Assume 80% pass through to consumer prices for temporary VAT cut in eligible sectors.
<i>plus</i> Coronavirus Job Retention Bonus (CJRB)	Assume all companies that furloughed employees claim the £1,000 bonus per employee rehired.
<i>plus / minus</i> VAT deferral	Estimate current VAT receipts and payments. Assume lag between cash inflow and cash outflow when company pays HMRC.
equals Cash-flow deficit after fiscal policy response	

Sources: Bank of England, HM Government