CPB Netherlands Bureau for
Economic Policy Analysis

A stress test of Dutch SMEs

This background document to CPB's Financial Stability Report provides policymakers with an initial assessment of the effects of the corona crisis on the liquidity position of Dutch SMEs and its impact on their solvency. The support measures announced in March and April 2020 have helped cushion corporate liquidity shocks. The effects are highly sector-dependent.

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CPB Background Document

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Summary

This background document to CPB's Financial Stability Report provides policymakers with an initial assessment of the effects of the corona crisis on the liquidity position of Dutch SMEs and its impact on their solvency. It provides information by means of a stress test. Based on 2018 administrative data on Dutch small and medium-sized enterprises (SMEs), we simulated the decrease in turnover for individual companies, in various sectors. On average, the pre-corona financial starting position of Dutch SMEs was good; many companies were both liquid and solvent. We subsequently looked at the impact of the corona shocks on the liquidity position and analysed the liquidity needs.

The support measures announced in March and April 2020 have helped cushion corporate liquidity shocks. The stress tests also took into account tax deferrals, the Temporary Emergency Bridging Measure to Preserve Employment (NOW), the Temporary Support Scheme for Self-Employed Persons (TOZO), and the Compensation for Entrepreneurs in Affected Sectors COVID-19 (TOGS). In addition, deferrals of interest payments and repayments offered by banks to their customers have also been taken into account.

During the first three months of the corona crisis, 30% of Dutch SMEs needed at least 12 billion euros in additional liquidity. Under continuing low turnovers, within six months, this amount will increase to 30 billion euros, for almost 50% of Dutch SMEs. A significant part of the liquidity need will be absorbed by government support measures. Incidentally, the scenarios we used contain assumptions that are likely to underestimate the stress resistance of the business community.

The effects are highly sector-dependent. The greatest need for liquidity is in trade, industry, transport & storage and the hospitality industry.[1] There are two explanations for this effect: these sectors were hit the hardest by the lockdown measures and had the most vulnerable starting position.

The solvency of most companies remains in order, according to the results from our stress tests, but this seems to be due, in part, to our assumptions which are likely to underestimate the effects of the corona crisis. Here too, there are strong differences between sectors. According to the scenarios, hospitality, trade, culture, sports and industry are hit the hardest, in terms of solvency. In these sectors, more than 25% of companies will be in a less secure solvency position within 6 months.

The government support package will have a positive spillover effect that is, however, not taken into account in this analysis. In our stress test, the total cost of all measures for a three-month period will be around 4 billion euros. This amount, ultimately, not only increases liquidity, but will also reduce job losses. The exact number of prevented job losses is as yet unknown. That depends on the delayed impact of problems at individual companies on others.

1 Methodology

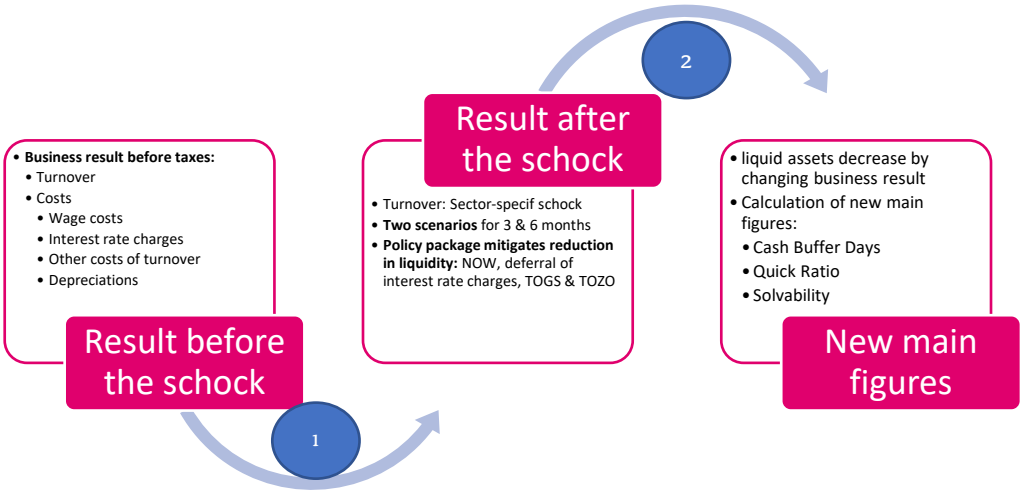
Our stress test is similar to a cash flow stress test. Such a test assesses how long a company will be able to pay the cash outflows (running costs) using available liquid assets. Figure 1.1 shows the methodology of the stress test in brief. The test consists of three steps and is very similar to scenarios recently published by the

[1] This is in line with recent survey results of CBS, accessed on 25 May 2020 (link).

OECD (OECD, 2020; Schivardi and Romano, 2020). Since we had no real cash flow data available, these had to be approximated, indirectly. This means that we used income statements to calculate the cash position of companies.

A lower business result leads to lower liquid assets. We used data from the income statements of all Dutch SMEs and, initially, simulated a 'shock' to their turnover. In a second step, we calculated the new business result over the period immediately following that shock.[2] We interpreted the difference between the business results before and after the shock as a decrease in liquid assets. This affected the financial situation (particularly liquidity and solvency) of a company, which we measured according to the usual financial ratios: cash buffer days, the quick ratio and, ultimately, solvency.

Figure 1.1 The stress test in brief



Our stress tests outline two scenarios in which the number of months of decreased turnover, including a government support package, varies between 3 (Scenario 1) and 6 months (Scenario 2). The 'government package' includes the NOW, TOZO, and TOGS schemes and the deferrals granted by the Dutch banks with respect to interest rate charges and other repayments. How we designed the packages and took them into account for the liquidity position is described in detail in the Appendix.[3]

The scenarios contain assumptions that are likely to underestimate the stress resistance of the business community. For example, we did not take into account the possibility of companies focusing on another market or closing their doors altogether, in order to reduce costs. The scenarios, therefore, are worst-case scenarios. Section 1.2 provides a detailed description of the assumptions. The Appendix contains formal descriptions of the stress tests.

1.1 Data

We used microdata from Statistics Netherlands (CBS) to compile a data set of the income statements of all Dutch non-financial corporations. We linked the financial statistics of non-financial institutions (nfo) to the General Business Register (ABR). The most recent year for which these data are available is 2018.

[2] We used the business results before tax.
[3] We did not include a VAT deferral. That will cause an underestimation of the effects of the package.

The random sample was limited to:

- Companies with fewer than 251 employees and a balance sheet total of less than 40 million euros.
- Companies that did not have an exit in 2018 (due to a merger or acquisition, restructuring or other type of exit).
- Only private limited liability companies (BVs).
- Companies with a positive balance sheet total.
- We removed companies with a negative solvency of less than -100% of their balance sheet total. We included those with negative equity, as this is not unusual for start-ups. If a starting company has just made a large investment, its accounting solvency can be negative. However, this does not mean that the company is also insolvent in economic terms.

Our data set contains a total of 260 thousand companies. This is largely representative of the Dutch business community, with an important reservation: our analysis did not include independent professionals with a legal form other than private limited liability companies (BVs). As a consequence, the liquidity needs of very small businesses, particularly those on a macro level, have likely been underestimated.

1.2 Main assumptions

1.2.1 Assumptions that are likely to underestimate stress resistance

- The analysis can be seen as an ex-ante analysis. We did not include behavioural responses or general equilibrium effects. For example, as we had no insight into the business dealings of companies during the timespan of our analysis, our calculations did not take into account any new financial obligations, such as bridging loans, which companies may have entered into during this period.
- Our analysis is an ex-ante policy analysis; we included the largest measures described in the Spring Memorandum 2020. This means that the analysis — very roughly — assumes deferral of all tax payments for the duration of the corona shock. In addition, we took into account the Temporary Emergency Bridging Measure to Preserve Employment (NOW), the Temporary Support Scheme for Self-Employed Persons (TOZO) and the Compensation for Entrepreneurs in Affected Sectors COVID-19 (TOGS). Since we excluded new bridging loans, guarantee schemes for bank loans do not play a role in these stress tests, either. In addition, we also excluded VAT deferrals.
- The analysis did not include the effect of accelerated carry-back losses of corporate tax, because tax data on 2019 were not available. By allowing a corona reserve to be deducted from 2019 profits, additional liquidity can be created.
- The situation at the end of 2018 provides a sufficiently representative picture of Dutch SMEs at the beginning of 2020. In contrast to all stress tests published so far, we used fairly recent data, whereas the most recent OECD studies use data from 2015 and 2016. Given that there was considerable economic growth in 2018 and 2019, for our analyses, we probably underestimated the starting position.[4]
- The change in liquid assets equals the change in business results before taxes. We also included depreciations and amortisations.[5] Because depreciations are mainly an accounting method to include any decrease in assets, we overestimated the decrease in the liquidity position.

1.2.2 Assumptions that are likely to overestimate resistance to stress

- We assumed that companies will not fire staff members if they make use of the NOW scheme. Wage costs thus will continue and, depending on the decrease in turnover, be absorbed by the NOW scheme for 90%.

[4] For companies that made major investments in 2019, we overestimated the starting position
[5] For more details, see Equation A1 in the Appendix.

Because our estimation of the degree to which the NOW scheme is used is likely to be on the high side, we thus overestimated the stress resilience of the business community.

- Furthermore, the analysis only looks at private limited liability companies (BVs). As a result, we did not include a large proportion of small companies, as these have different business entities (general partnerships, sole proprietorships). The reason for this is that Statistics Netherlands is not in possession of balance-sheet micro-data on these business entities. In some sectors (e.g. the hospitality industry and other services), this mainly leads to an underestimation of overall liquidity needs.
- These analyses do not take into account any general equilibrium effects, which, for example, have an impact on the market value of the balance sheet. SME balance sheets may well deteriorate as a result of the general decline in the economic situation; for example, stocks and fixed assets may be sold at lower prices than in 2018.

1.2.3 Assumptions that are likely to underestimate or overestimate stress resistance

- Our models contain no uncertainty. This means that we did not make any assumptions about the probability distribution of the parameters. If the decreases in turnover are less severe than what is assumed in the calculations, the stress resistance will have been overestimated, as will the effects for certain companies (and vice versa).
- For the analysis, the elasticities of operating costs — the extent to which costs decrease as turnover decreases — were based on the most recent OECD studies. Depending on the deviations in these elasticities, the adjustments to running costs will have been either underestimated or overestimated. If the elasticities were too high, the adaptability of companies will have been overestimated. If elasticities were too low, the adaptability was underestimated.

2 Results

2.1 Liquidity

The liquidity position of companies deteriorates in the stress test. We used three measures of liquidity. First, the new need for liquidity is demonstrated. The definition of liquid assets includes cash, bills of exchange, cheques, term deposits, current-account balances and other short-term claims on financial institutions, such as call loans. Second, the distribution of the number of cash buffer days is provided, and, thirdly, the distribution of quick ratios per scenario.

2.1.1 Liquidity requirement

The longer the crisis, the greater the liquidity needs of SMEs. Figure 2.1 shows the percentage of companies facing negative liquidity, in situations with and without government support measures. Figure 2.2 shows the minimum liquidity needs in billions of euros, for the various scenarios. The policy package also creates additional liquidity needs of at least 2 billion euros after a period of three months. We calculated the liquidity needs as the sum of 'negative liquid assets' caused by the revenue shocks in our analysis. On a macro level, this need was only 'minimal', because our stress tests only included SMEs registered as private limited liability companies (BVs), rather than all SMEs.

The policy package of support measures mitigates liquidity needs. Our scenario analyses show that, without the policy package, liquidity needs would probably have been much higher. Without the package, more than 30% of SMEs would experience negative liquidity within three months, which corresponds to a need of over 10 billion euros. The package appears to have reduced this to 20% of SMEs and to 2 billion euros.

However, the underlying differences between sectors are strong. The percentage of companies in need of liquidity differs per sector (Figure 2.2, left), as does the amount needed (Figure 2.2, right). The largest liquidity needs arise in trade, industry, consultancy & research, and hospitality. Trade, notably, shows the largest absolute liquidity needs.

Figure 2.1 Percentage of companies with additional liquidity needs (left) and estimated liquidity needs for various scenarios

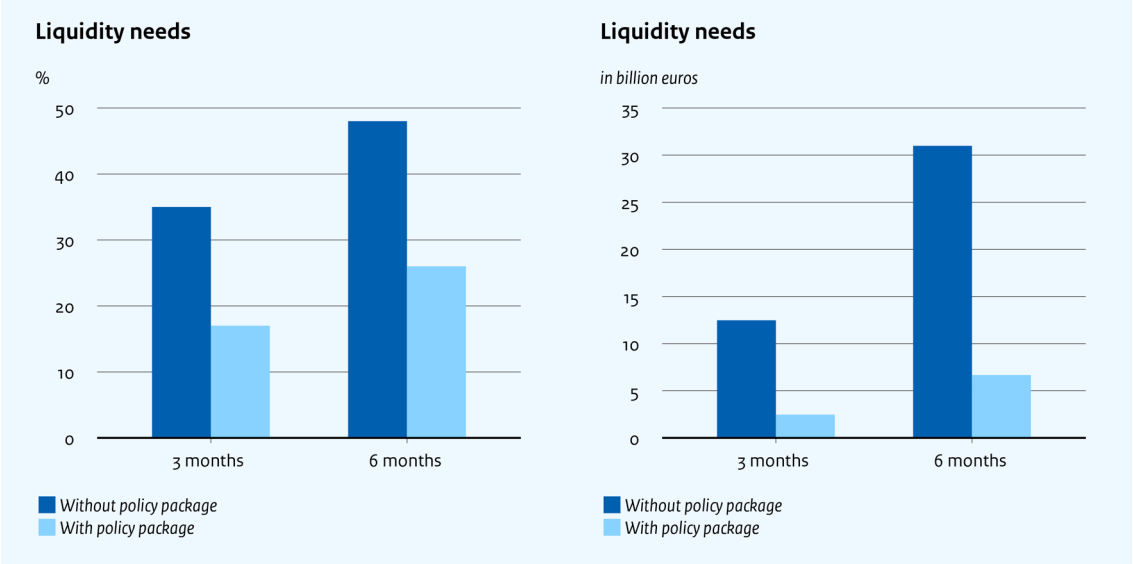
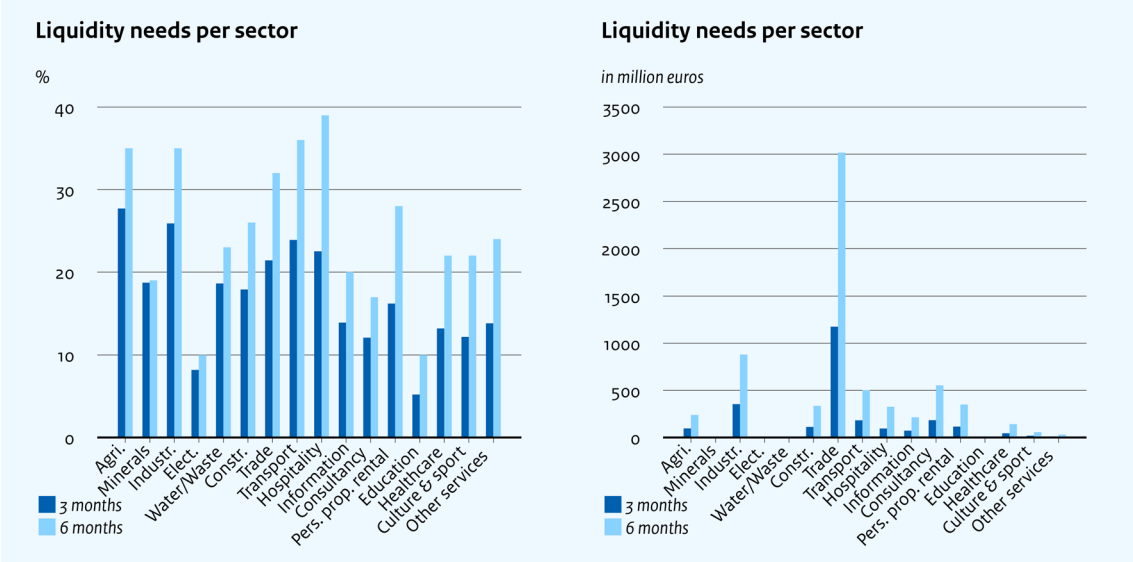


Figure 2.2 Percentage of companies with additional liquidity needs (left) and estimated liquidity needs for various scenarios, per sector



2.1.2 Cash buffer days

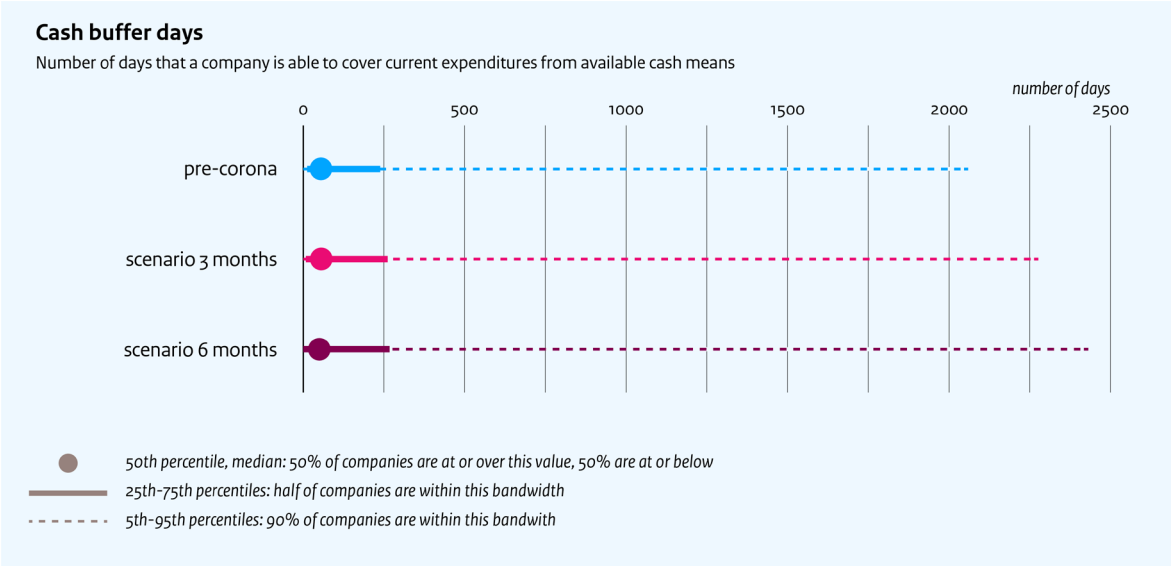
The longer the lockdown, the more companies are unable to meet their daily costs. The *cash buffer days* (CBD) measure outlines the capacity of a company to cover its daily costs, under an extreme scenario. Using Equation 1, we calculated the number of days a company would be able to pay its costs from its liquid assets. In this case, we also took into account the possibility of part of the costs being lower during the corona crisis. This could theoretically lead to an increase in CBDs; d is the duration of the crisis in months.

$$CBD_{is}(d) = \frac{Liquide\ \ assets\ \ _{is}(d)}{\frac{interest\ rate\ changes\ \ _{is}(d) + wage\ costs\ \ _{is}(d) + other\ costs\ \ _{is}}{365}} \quad (1)$$

Therefore, figures cannot be used literally but have to be interpreted within a certain margin.

In the absence of certain information, we needed to make additional assumptions in calculating cash buffer days. For example, we assumed a company's liquid assets to be immediately accessible, in other words, to be directly converted into cash. In reality, this will not be the case, which is why the liquidity position is likely to have been slightly overestimated, here. At the same time, we deliberately did not include trade debtors and trade creditors, because due to the corona crisis, some companies may no longer be able to pay their creditors, and others, therefore, may not be able to collect on their debts.[6]
Including debtors in a company's liquid assets could thus lead to an overestimation of its liquidity position. With regard to the cash outflow (denominator of Equation 1), we assumed all annual cash outflows could be averaged over the year (per month). However, this also means that cash outflows before taxes could have been overestimated; for example, when there are significant variations (or a negative deviation) in costs during the year, compared to the average. This, in turn, would mean that the total number of cash buffer days were underestimated.

Figure 2.3 Cash buffer days for various scenarios

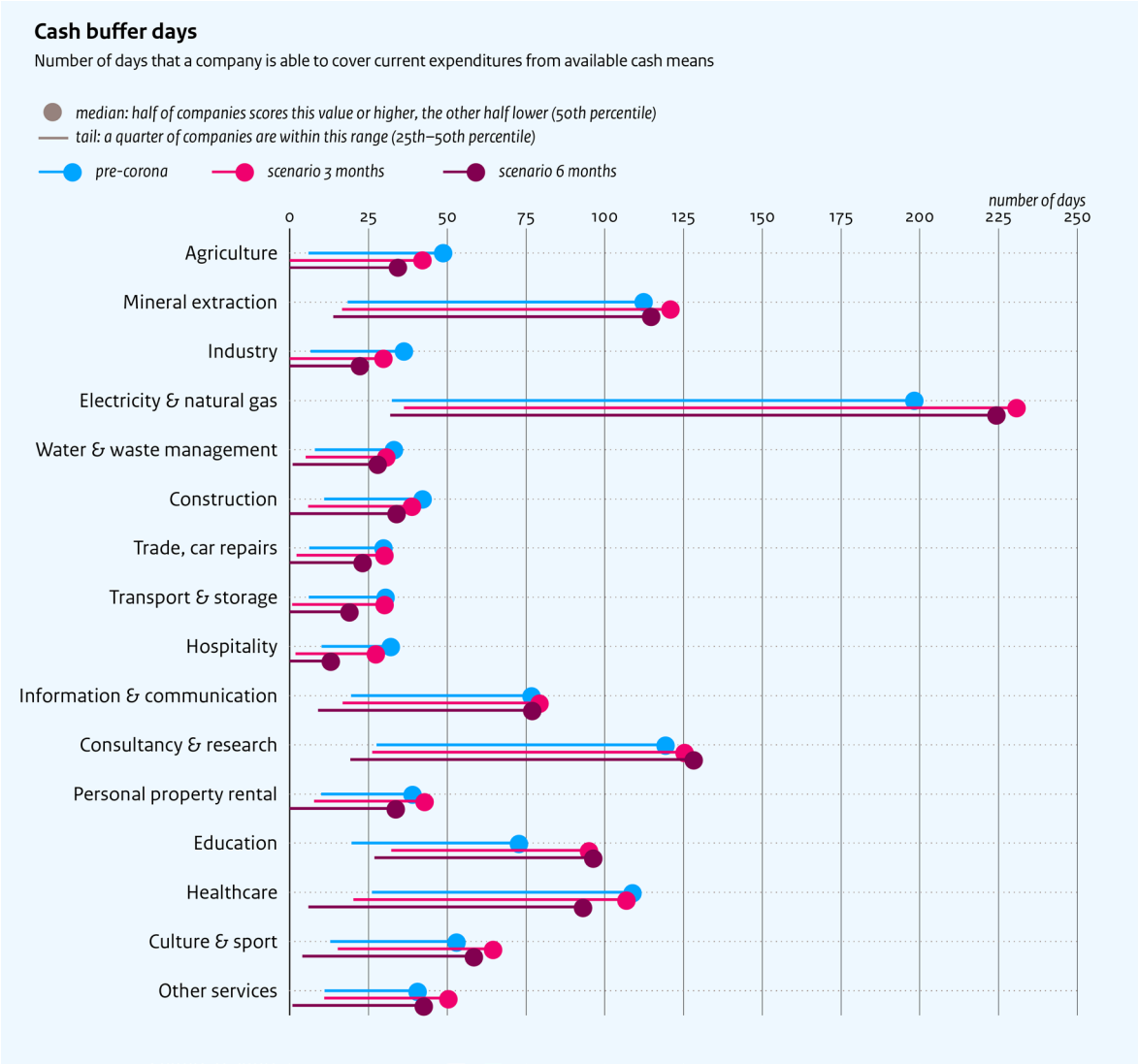


The policy package of support measures is likely to have absorbed a very sharp decline in cash buffer days. Our analysis shows, for example, hardly any change in the number of cash buffer days after three months, for the median company.

Here, too, considerable differences between sectors can be seen. Figure 2.4 shows the change in the median and the 25th percentile of cash buffer days, from before the corona crisis to after six months of lockdown. The 25th percentile equals zero, in certain sectors. This means that 25% of companies in agriculture, industry, construction, trade, transport, hospitality and personal property rentals no longer have a cash buffer after six months, according to our stress test.

[6] There is probably a difference here between business-to-business (B2B) companies and business-to-customer (B2C) companies. For B2B companies, this assumption is more apt than for B2C companies. Because with B2C companies, most transactions are settled immediately, the CBDs for these types of companies are underestimated here. Unfortunately, our data do not allow us to distinguish between B2C and B2B.

Figure 2.4 Cash buffer days: median and 25th percentile in various sectors and scenarios



2.1.3 Quick ratios

The quick ratio (QR) indicates the extent to which a company is able to repay its current outstanding debts and trade creditors, using its currently available liquid assets and trade debtors.[7] A healthy quick ratio has a value of over 100. This indicates that a company is always able to meet all of its short-term obligations from its liquid assets. An important nuance, here, is that the healthy level of this measure mainly applies to companies with few fixed assets on their balance sheet, which they can offer as collateral in order to quickly regain liquidity. Companies that have collateral and therefore find it easier to obtain a loan can also be considered healthy — even when their QR is below 100.

The quick ratio (QR) was calculated as follows: [8]

$$QR(d)_{is} = \left(\frac{liquid\ assets(d)_{is} + short-term\ claims(d)_{is} + trade\ debtors(d)_{is}}{short-term\ debt_{is} + trade\ creditors_{is}}\right) * 100 \qquad (2)$$

[7] Short-term debts are debts with a repayment term of one year, at the most.

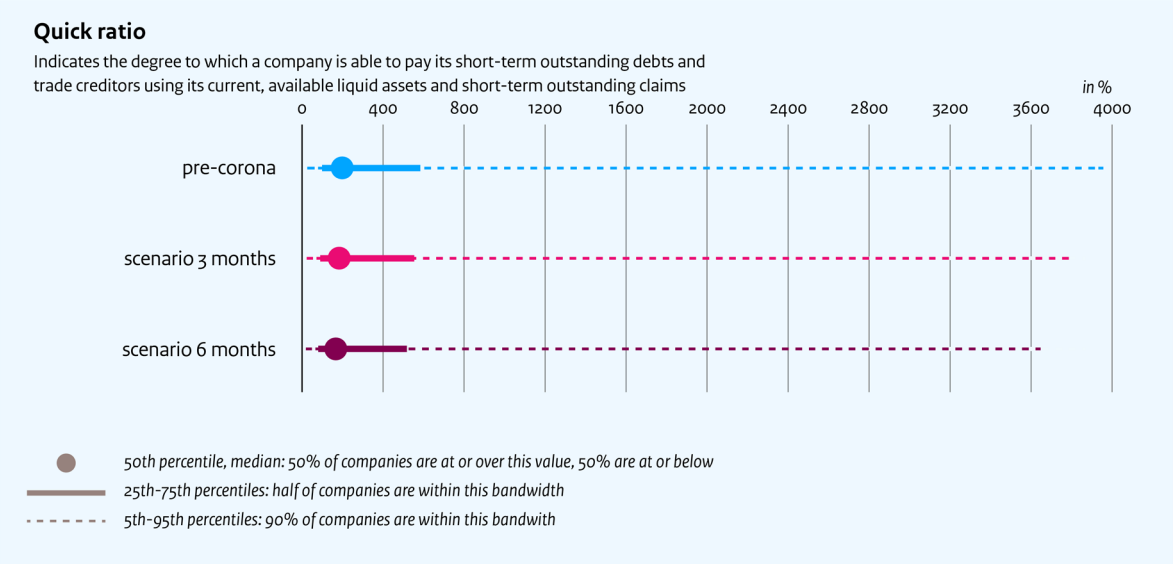
[8] Short-term claims and claims on trade debtors are assumed to change as follows: $Short-term\ claims(d)_{is} = (1-k_s) * short-term\ claims$, $trade\ debtors(d)_{is} = (1-k_s) * trade\ debtors(d=0)_{is}$

After a crisis period of six months, approximately 50% of companies will have a quick ratio of below 100.[9] Such a quick ratio is particularly problematic for companies with less access to additional liquidity. These companies include those with a sharply declining turnover and those with few assets on their balance sheets to use as collateral for obtaining new credit lines.

Here, too, strong differences can be seen between sectors. Figure 2.6 shows that the sectors differ in starting positions, but also in the degree to which they have been affected. The hospitality industry shows the relatively largest decline in quick ratio, but absolute declines are also strong in the healthcare sector.

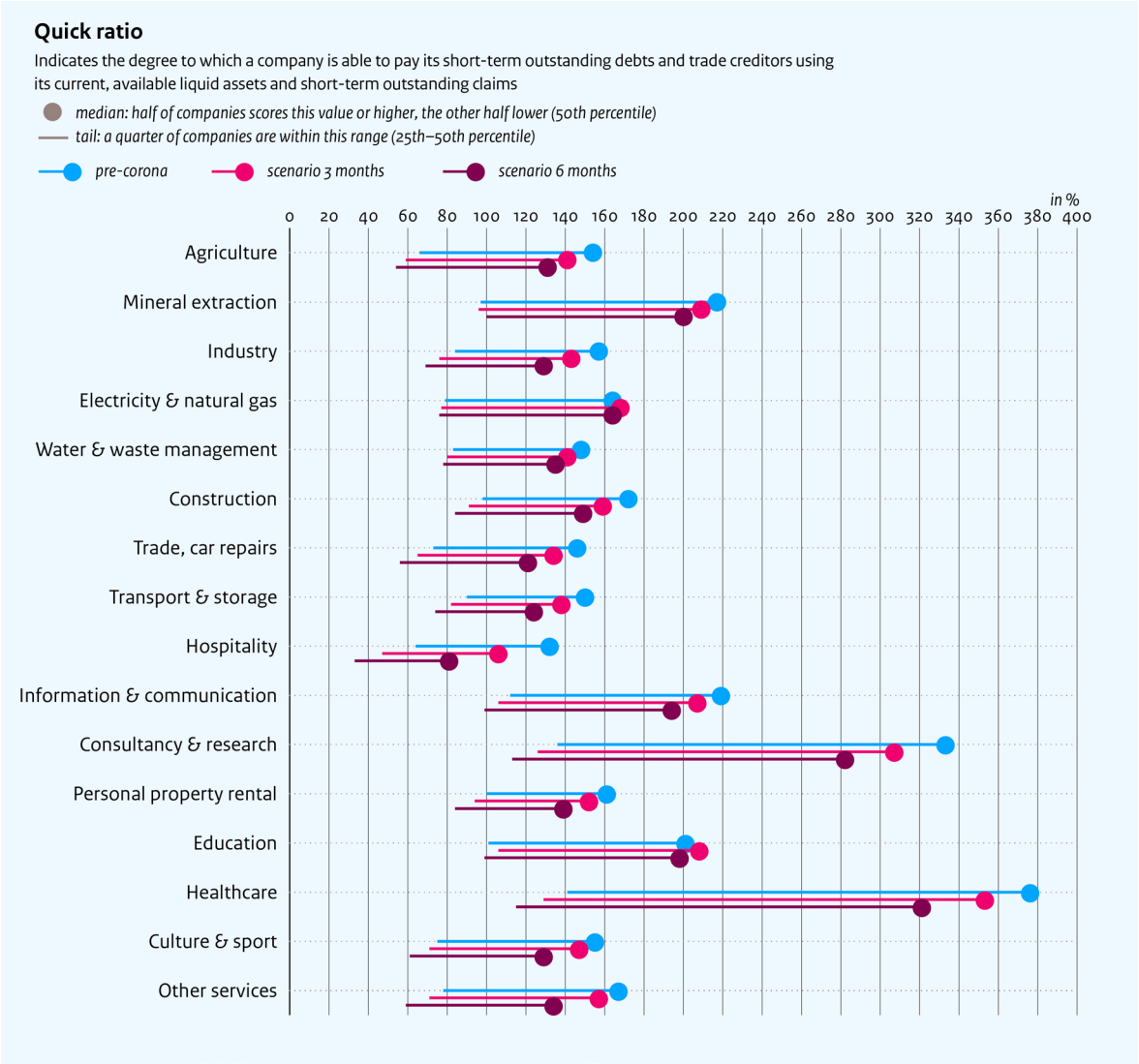
The quick ratio, particularly, is an indicator of the liquidity position over the whole year. The ratio indicates the extent to which a company is able to meet all its obligations within one year, using its current liquid assets. Short-term debts include, for example, bank loans that can be extended again if and when a company is sufficiently solvent.

Figure 2.5 Quick ratio distribution for various scenarios



[9] The quick ratio was set to zero for companies with negative liquid assets.

Figure 2.6 Quick ratio: Median and 25th percentile in various sectors and scenarios



2.2 Solvency

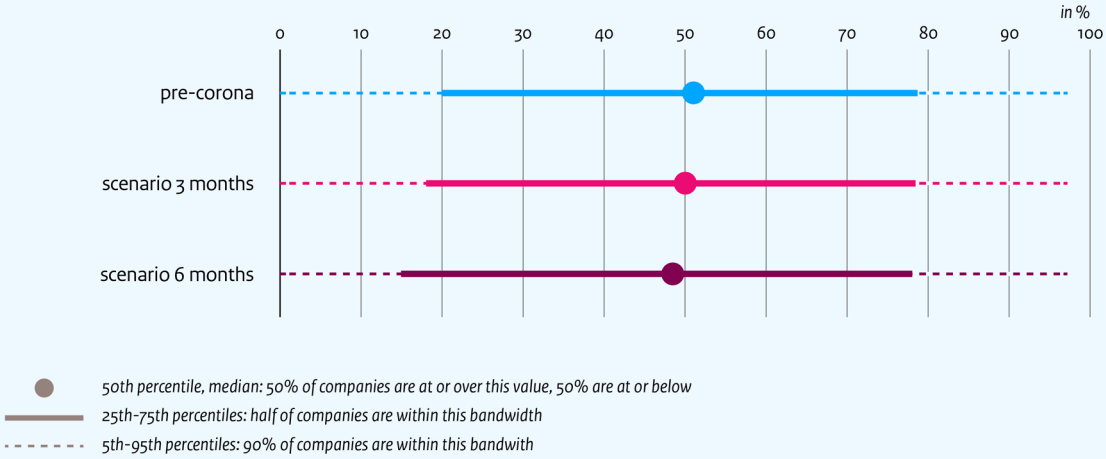
The solvency position of most Dutch SMEs only slightly decreases, under our scenarios, which is very likely an underestimation (Figure 2.7). This has to do with how the solvency position is calculated (see Equation 3). As we performed an ex-ante analysis, the outlined scenario is extremely positive. For example, we assumed that equity will decrease with the amount in liquid assets. The denominator, the balance sheet total, *decreases* with the change in liquid assets and no new obligations in the form of liabilities are added.[10] This, thus, led to an overestimation of solvency, because we assumed that no new liabilities in the form of loans would increase the balance sheet total. In addition, a decrease in the value of existing assets was not yet taken into account.

$$Solvency(d)_{is} = \left(\frac{equity(d)_{is}}{Balance\ sheet\ total(d)_{is}}\right) * 100 \qquad (3)$$

[10] The Appendix contains a detailed description.

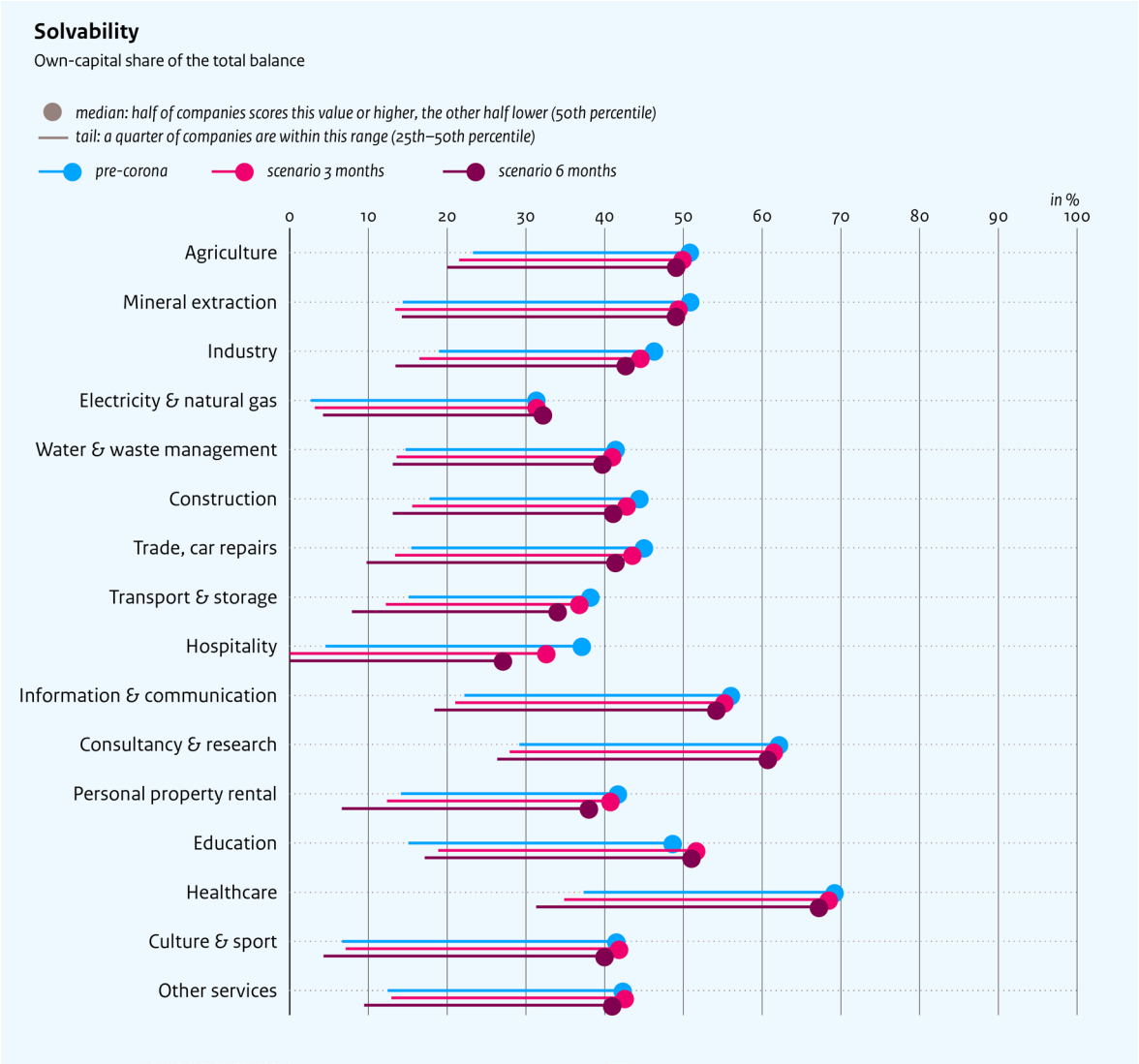
It must be noted that our analysis outlines solvency, purely, from a balance-sheet perspective. This is not the same as *economic* solvency, which is about the true and actual value of a company's assets and how that is likely to change over the course of the corona crisis. These effects will also differ from sector to sector, and require a more extensive analysis.

Figure 2.7 Distribution of the solvency position for different scenarios



Here, too, strong differences can be seen between sectors. In general, banks regard solvency ratios of between 25% and 40% as healthy. The scenarios show that solvency problems are likely to occur mainly at the lower end of the distribution. This mostly applies to industry, trade, transport, hospitality, personal property rentals, and culture & sport.

Figure 2.8 Solvency: median and 25th percentile in different sectors and scenarios



A Appendix

A.1 The procedure in detail

A.1.1 Business result before taxation form the starting point

The most important part of the stress test is the equation below. In it, the different scenarios for the *annual* business result before taxes are calculated in thousand euros $RB(d)_{is}$ for company i in sector s. The parameter d stands for the duration of the decrease in turnover, in *months*.

$$
\begin{aligned}
RB(d)_{is} = f_s(turnover_i) - c_s(costs_i) = \qquad & \text{(A1)} \\
& (1-k_s) * turnover_i \\
& - \underbrace{\left(1 - w(k_s)\right)}_{NOW\ scheme} * (1 - e_l * k_s) * wage\ costs_i - \underbrace{\left(1 - r(k_s)\right)}_{interest\ rate\ deferral} * (1 - e_r * k_s) \\
& \qquad * interest\ charges_i \\
& - (1 - e_o * k_s) * other\ costs_i - (1 - e_a * k_s) * depreciations_i \\
& - (1 - e_e * k_s) * additional\ costs + overigebaten_i + \underbrace{tozo(k_s)_{is}}_{TOZO} + \underbrace{togs(k_s)_{is}}_{TOGS}
\end{aligned}
$$

A.1.2 Turnover shocks k_s

The choice of shock parameters is the most important ingredient in the stress tests. The sector-specific parameters were chosen on the basis of hourly decreases from a representative sample of the LISS panel from April 2020. The differences between companies within one sector were taken into account by using information on recent NOW applications per sector. The parameters are shown in Table A.1.

Our estimation of the decrease in turnover seems optimistic, at the current state of affairs. Estimates from Rabobank and the Dutch Public Employment Service (UWV), for example, clearly paint a more pessimistic picture.[11] This is mainly due to the fact that the UWV figures are based only on the companies that are actually eligible for the scheme. This selection leads to an overestimation of the actual decrease in turnover.

[11] The Rabobank figures can be found here (link), and were accessed on 25 May 2020). The factsheet about the NOW applications in April can be found here (link).

Table A.1 Monthly turnover shocks, per sector (excluding general shock)

Sector	SBI	Turnover decrease in % for entire sector based on LISS: $p_s * k_s^{max} + (1 - p_s) * k_s^{min}$	Turnover decrease for companies who applied for NOW: k_s^{max}	Turnover decrease for the rest: k_s^{min}	% companies who applied for NOW in sector: p_s
Agriculture	A	10%	64%	9%	2%
Mineral extraction	B	0%	0%	0%	0%
Industry	C	11%	56%	5%	12%
Electricity & natural gas	D	0%	0%	0%	0%
Water & waste management	E	0%	0%	0%	0%
Construction	F	5%	51%	5%	1%
Trade	G	17%	75%	6%	16%
Transport & storage	H	12%	61%	9%	7%
Hospitality	I	45%	82%	19%	42%
Information & communication	N	12%	55%	7%	10%
Consultancy & research	S	7%	64%	19%	21%
Personal property rental	H	7%	61%	9%	7%
Education	P	16%	64%	16%	0%
Healthcare	Q	12%	77%	7%	7%
Culture & sport	R	28%	79%	27%	1%
Other services	S	28%	64%	19%	21%

We introduced a general shock of 10% of the *monthly* turnover for the whole economy ($\boldsymbol{k^m}$). With this parameter, we approximated the effects of a demand shock caused by a recession and the resulting general equilibrium effects which, subsequently, affect the whole economy. We scaled this shock back to an annual level to arrive at an average shock per sector, in Equation A2. We also assumed that the duration of the shock would be the same in each sector.

Finally, we took into account different turnover losses per sector. For this purpose, from a uniform distribution ($p \sim U[0,1]$]), we randomly selected a number of companies that would receive either a large shock (k_s^{max}) or a small shock (k_s^{min}). Whether a company experiences a large or small shock in the stress test, therefore, was not related to characteristics of that company within its sector. This is how we arrived at the average turnover shock per sector:

$$\overline{k_s} = k_s(k^m, k_s^m, d) = \frac{d}{12} * [(1 - p_s) * k_s^{min} + p_s * k_s^{max} + k^m] \quad \text{(A2)}$$

An example clarifies how a shock to the annual turnover for the duration of three months was calculated. Example of a company in the industrial sector that experienced a strong turnover shock:

$$\underbrace{\frac{3}{12}}_{Duration\ in\ years} * \underbrace{(0{,}56}_{size\ sector\ shock\ per\ month} + \underbrace{0{,}1}_{general\ shock}) = \underbrace{0{,}165}_{shock\ on\ annual\ level\ per\ sector} \quad \text{(A2')}$$

We compared our results against the pre-corona situation. As can be seen from comparison (A1), $k_s = 0\ \forall s$ was the 'normal' baseline for Dutch SMEs in 2018. We used this situation as a benchmark to compare various scenarios.

A.1.3 Cost elasticities

Every company has fixed and variable costs. A turnover shock not only reduces the turnover but also decreases the variable part of the costs. Because we did not know which percentages of the indicated costs were either fixed or variable, we had to estimate these percentages. The parameters e_l, e_r, e_o, e_a, e_e represent cost elasticities. They indicate the percentage points by which the costs would decrease if turnover decreases by 1%. For example, $e_o * k_s$ indicates the extent to which other annual turnover-related costs (e.g. purchases or rent) would decrease due to a reduction in turnover, for each company, within a certain sector.

Two extreme scenarios for these parameters serve as an example.
(1) $e_. = 0.$. In this case, all costs are fixed and therefore will continue, also if turnover decreases.
(2) $e_. = 1.$ In this case, all costs are variable. In case of a decrease in turnover, companies are thus able to adjust their costs, immediately.

Here, we used the most recent OECD study on the effects of COVID-19 on the liquidity position of companies (OECD, 2020). We adopted the OECD's parameters for the elasticities of labour costs and other costs related to turnover. These are also the largest cost categories, for most companies. We chose the parameters presented in Table A.2 for the other elasticities with regard to interest-rate costs, depreciations and additional costs. For interest charges and depreciations, we chose an elasticity of 0 to represent a realistic extreme scenario. For additional costs, we applied an elasticity of 0, because Statistics Netherlands (CBS) indicates that these costs are not related to actual business operations.

Table A.2 Parameters of cost elasticities

Costs	Parameter	Value
Other turnover costs	e_o	.8
Wage costs	e_l	.2
interest rate charges	e_r	0
Depreciations	e_a	0
Additional costs	e_e	0

A.1.4 Crisis management design

The stress test takes into account the four most important policy measures implemented by the Dutch Government: NOW, deferrals of interest rate charges and repayments, TOGS and TOZO. This section explains how the measures have their impact on the new business result and liquidity position.

NOW scheme

The Temporary Emergency Bridging Measure to Preserve Employment (NOW) was given the following functional form: k_s^m is the *monthly* decrease in turnover in each sector, k_s is the *annual* decrease in turnover. The calculation of k_s is shown, in Equation (5).

$$w(k_s) = \begin{cases} 0, k_s^m < 0.2 \\ 0.9 * k_s, k_s^m \geq 0.2 \end{cases} \quad \text{(A5)}$$

We assumed companies would not fire any permanent or temporary staff members. In practice, this means that the wage cost elasticity e_{kl} was set to 0. An important note, here, is that temp work and payrolling were included in the 'other costs' related to turnover, rather than in wage costs. In the stress tests, we did allow an adjustment for this cost category.

Deferral of interest rate charges & repayments

In mid March, the Dutch Banking Association (NVB) announced that it would defer interest rate charges and repayments for six months, for entrepreneurs. Since March, according to the NVB, a large number of companies have made use of this option.[12] This support measure was given the following functional form:

$$r(k_s) = \begin{cases} 0, k_s^m = 0 \\ 0.5\,, k_s^m > 0 \end{cases} \quad \text{(A6)}$$

TOZO

We applied the Temporary Support Scheme for Self-Employed Persons (TOZO), in the following manner: Each company with 1 or less employees and a lower business result of 1.25 thousand euros will receive an amount of 1.25 thousand euros for the duration d. This amount is in-between the amounts for single and multi-person households.

$$TOZO(k_s)_{is} = \begin{cases} 1{,}25 * d, \frac{RB(d)_{is}}{12} < 1{,}25 \wedge employees_{is} \leq 1 \\ 0\,, other \end{cases} \quad \text{(A7)}$$

TOGS

We also implemented the Reimbursement for Entrepreneurs in Affected Sectors COVID-19 (TOGS) scheme. Equation (8) describes how we determined whether companies would be eligible for these measures. To all eligible companies in the sectors involved, we allocated an amount of 4,000 euros. The list of sectors ($SBI\ 2\ Codelijst$) was obtained from the website of the Netherlands Enterprise Agency (RVO.nl).[13]

$$TOGS(k_{is}) = \begin{cases} 4, k_s > 0\,, \quad \forall\, s\, \epsilon (SBI\ 2\ Codelijst) \\ 0, other \end{cases} \quad \text{(A8)}$$

A.1.5 From business results to a new liquidity and solvency position after corona shock

Liquid assets decrease and increase with the amount by which the business result changes. An important indicator of a company's health is its liquidity position. The new liquidity position was calculated as follows: we assumed that the liquid assets on the balance sheet of each company decrease or increase by exactly the amount where by the business result decreases or increases. The liquid assets of company i in sector s therefore depend on how much the business result has changed after d months:

$$liquid\ assets_{is}(d) = liquid\ assets_{is}(d=0) + \Delta RB = \\ liquid\ assets_{is}(d=0) + [RB(d)_{is} - RB(d=0)_{is}] \quad \text{(A9)}$$

The new solvency position of each company was also calculated. We assumed the equity to decrease by the amount in liquid assets.

$$Solvency(d)_{is} = \left(\frac{equity_{is} + \Delta liquid\ assets(d)_{is}}{Balance\ sheet\ total(d)_{is}}\right) * 100 \\ = \left(\frac{equity_{is} + [liquid\ assets\ (d=0)_{is} - liquid\ assets(d)_{is}]}{Balance\ sheet\ total(d=0)_{is} + [liquid\ assets\ (d=0)_{is} - liquid\ assets(d)_{is}]}\right) * 100 \quad \text{(A10)}$$

A.1.6 Sanity checks

Simple 'sanity checks' of the simulation show that the calibration of the parameters did not deviate too much from reality. Our simulation, after a three-month period, yielded around 107,000 companies that were

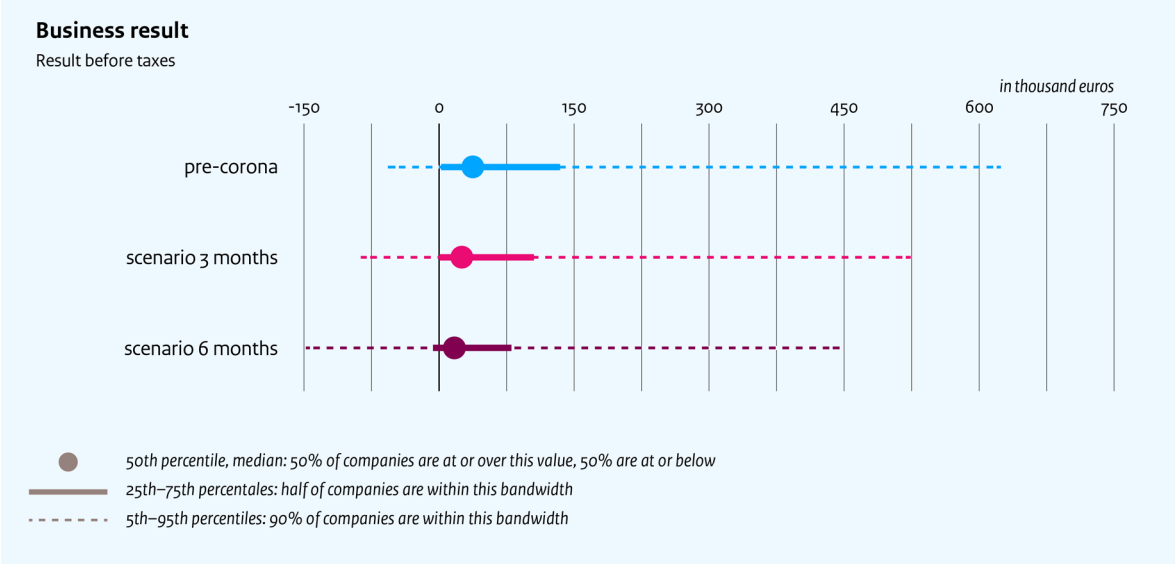
[12] See this website, accessed on 25 May 2020 (link) and this article in the fd, accessed on 25 May 2020 (link).
[13] https://www.rvo.nl/subsidie-en-financieringswijzer/togs/vastgestelde-sbi-codes-0

being 'supported' under the NOW scheme. This is very similar to the actual figure of the Dutch Public Employment Service (UWV). The simulated costs of the support package also closely resemble the figures that have recently come available. Detailed figures are available on request.

A.2 Business results

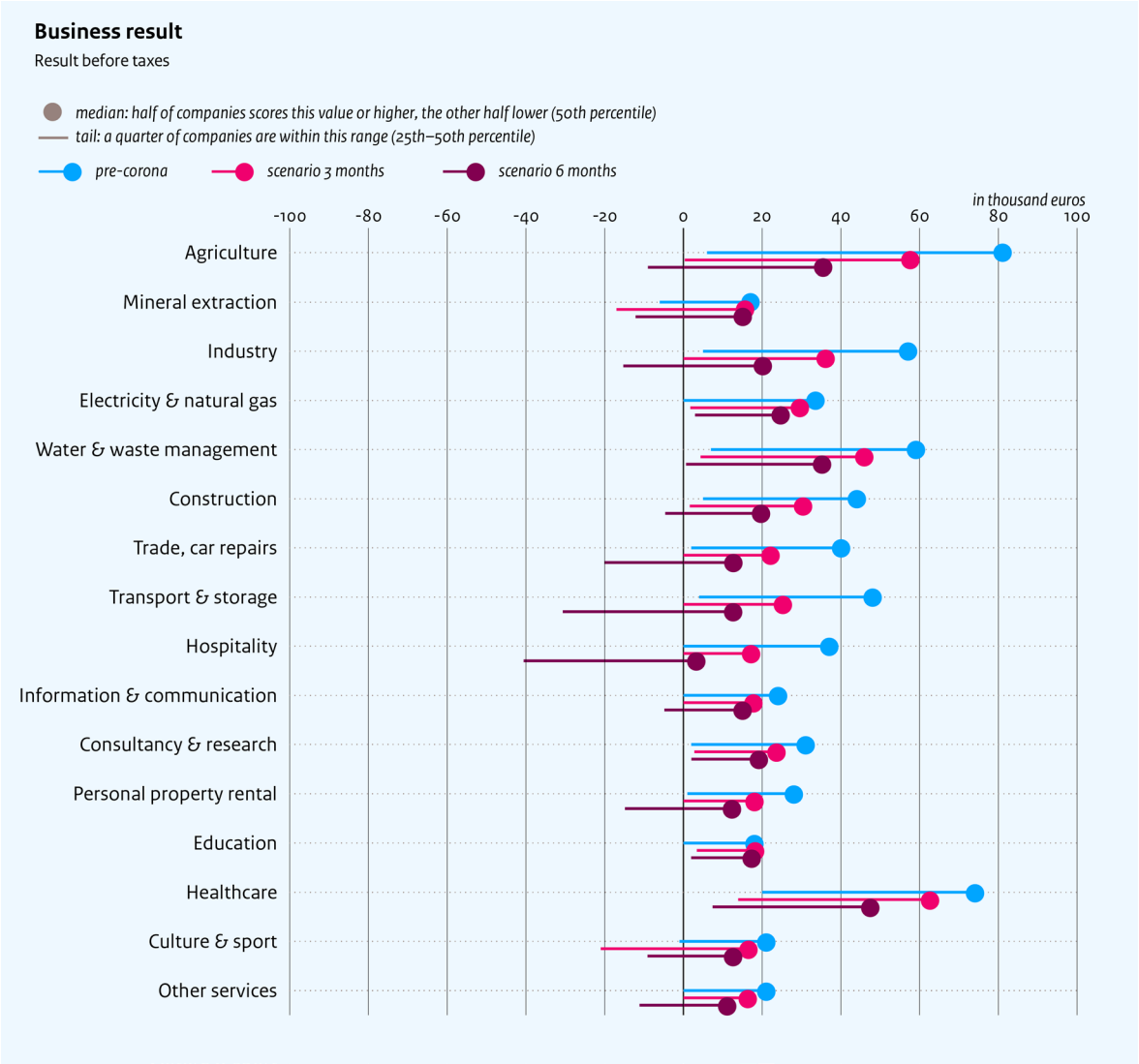
The business result of Dutch SMEs, before taxes, decreased sharply in this stress test. After a crisis period of three months, the business result of the median company fell by more than a third. As shown in Figure A.1, 25% of companies had a negative result, before taxes, after a three-month crisis. After six months, median business results had more than halved.

Figure A.1 Distribution of business result before taxes (in thousands of euros)



There are, of course, considerable underlying differences between sectors. The hardest hit sectors are mainly those with the sharpest declines in turnover: hospitality, transport and trade.

Figure A.1 Business results (in thousand euros): median and 25th percentile in various sectors and scenarios



A.3 Results per sector

Table A.3 Number of observations per sector

	Sector	Observations
	All sectors	266395
1.	Agriculture	6869
2.	Mineral extraction	171
3.	Industry	20955
4.	Electricity & natural gas	562
5.	Water & waste management	827
6.	Construction	24280
7.	Trade, car repair	58845
8.	Transportation & storage	9515
9.	Hospitality	9665
10.	Information/communication	20955
11.	Consultancy & research	72677
12.	Personal property rental	16458
13.	Education	3613
14.	Health care	13878
15.	Culture & sport	5144
16.	Other services	1981

References

OECD (2020). Corporate sector vulnerabilities during the Covid-19 outbreak: assessment and policy responses. [5 May 2020] (link)

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