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Liquidity Reserves of Danish Firms: implications during the COVID-19 epidemic

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Liquidity Reserves of Danish Firms: implications during the COVID-19 epidemic

- What is the ability of Danish firms to finance operational costs through liquid assets? Can wage subsidies help highly illiquid firms? We present preliminary results to support COVID-related scenario analysis of the financial need of Danish firms.
- About one third of Danish firms have no or negligible liquidity reserves (excluding undrawn committed credit lines).
- The median firm has liquidity reserves covering about one month of "fixed capacity cost".
- These numbers are only very slightly higher than at the onset of the financial crisis in 2007.
- Wage subsidies and cost compensation policies help to extend the duration of liquidity reserves for firms with some reserves. However, they cannot substantially extend the ability to sustain "fixed capacity cost" for firms that have very small reserves to begin with.

Introduction

Firms rely on external and internal sources of liquidity to meet their obligations towards employees, suppliers and lenders. The most important internal source of liquidity is revenue from sales. When this cash flow is interrupted, firms will have to turn towards their internal cash reserves and external sources of liquidity, such as borrowing from banks or other firms, or ultimately cost reduction measures.

In this memo, we describe the distribution of internal liquidity reserves across Danish firms in the years prior to the onset of the corona crisis, and consider the potential consequences of the drop in revenues resulting from the coronavirus epidemic for their financial situation. We measure liquidity reserves as short-term liquid assets divided by monthly "fixed capacity cost", which is meant to capture the cost of maintaining firms' current productive capacity without any actual production – including maintaining the current workforce. This measure is interesting for two reasons. First, it provides a simple summary statistic of liquidity reserves adjusted to the scale of a firm. Second, it can also be directly interpreted as the time (in months) before a firm runs out of internal liquidity and has to turn towards external financing or capacity reductions in the event of a "sudden stop" in which revenues and production drop to zero. While this is a useful worst-case scenario for expository purposes, it is not a realistic picture of current economic conditions. In most sectors, firms still generate substantial revenues, and in sectors in which production has been shut down due to public health concerns, cost compensation schemes and rescue packages have been set up.

Following the 2008 financial crisis, economic research has shown the importance of firms' financial constraints for reductions in employment and ultimately persistent drops in output. This literature has established that firm illiquidity –as opposed to insolvency – can be a severe problem with important macroeconomic consequences in the short and medium terms. This result has originally been documented for the United States (see Chodorow-Reich, 2014) and has also been confirmed for firms in Denmark during the financial crisis (see Zuellig, 2020). The latter contribution uses a measure of liquidity very similar to the one used in this memo, and shows that it is highly predictive of employment losses during and after the financial crisis.

The importance of firms' liquidity has already led to a number of important contributions in the context of the coronavirus epidemic. Acharya and Steffen (2020) show that investors have started to pay premiums for stocks of firms with better access to liquidity. Moreover, they show that from the start of the epidemic, firms have engaged in precautionary issuing of bonds and have drawn from of allocated credit lines to increase their cash reserves. Banerjee et. al. (2020) analyse the liquidity reserve of corporations in major developed economies and find that the median firm does not have cash reserves to cover debt financing costs during the coming year. Undrawn credit lines are sufficient to cover debt financing costs, but these credit lines typically have a short maturity and banks may not always renew them, especially in times of high uncertainty.

Motivated by this background we provide a descriptive overview of the internal liquidity situation of Danish firms heading into a coronavirus recession. We find that about one third of Danish firms have no or negligible internal liquidity reserves. The median firm has liquidity reserves covering about one month of fixed capacity cost. These numbers are only very slightly higher than at the onset of the financial crisis in 2007. Finally, we assess the extent to which wage subsidy policies as implemented by the Danish government

alleviate possible liquidity shortfalls in case of a sudden stop of economic activity. Labour costs are by far the largest component of fixed capacity cost, and wage subsidies help alleviate the possibility of a liquidity shortage. An 80 per cent wage subsidy almost triples the time to exhaustion of liquidity reserves to slightly less than three months for the median firm. However, wage subsidies have a limited impact for the lower tail of firms that hold no liquidity reserves at all. These firms will have to rely on cost reductions, equity injections, loans and credit lines to survive a sudden drop in revenues.

Data and methodology

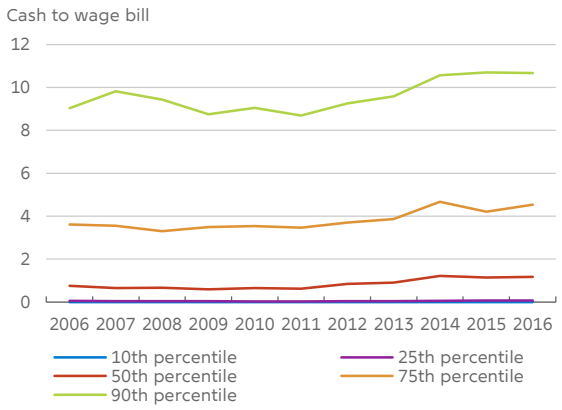
Our assessment is based on 2016 balance sheet information collected by Statistics Denmark (DST) in the "Regnskabsstatistikken" database (FIRE). FIRE is mostly based on a survey that is representative of firms covering 56 per cent of private sector employment in Denmark and 41 per cent of overall employment. Some sectors (finance, agriculture) and all firms with less than five employees are excluded from the survey and are not covered in our results.

We calculate the ratio M of liquidity reserves C to monthly fixed capacity cost F. As a baseline, we define C as cash (including other liquid assets in some of the results) reported in November 2016 balance sheets. We define monthly fixed capacity cost as:

F = (Wage bill + Social security contributions + Pension contributions + Short-term rent + Long-term rent and leasing + Interest cost) / 12

Chart 1 presents the distribution of the cash to wage bill ratio over the 2006 to 2016 period and shows that liquidity reserves are very stable over time, with a slight upward trend after 2011.

Distribution of liquidity reserves over time Chart 1

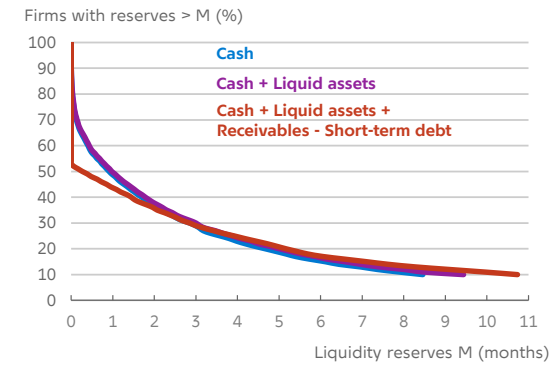


Source: Own calculations based on DST microdata.

Firms' liquidity situation

We present distributions graphically as "inverse percentile plots". All charts have liquidity reserves M (in months) on the horizontal axis, and the share of firms with reserves larger than M (in per cent) on the vertical axis. In the extreme case of a complete shutdown of all economic activity, the graphs can also be interpreted as a "survival" function providing the share of firms that have not yet run out of internal liquidity after M months.

Firms' liquidity reserves Chart 2



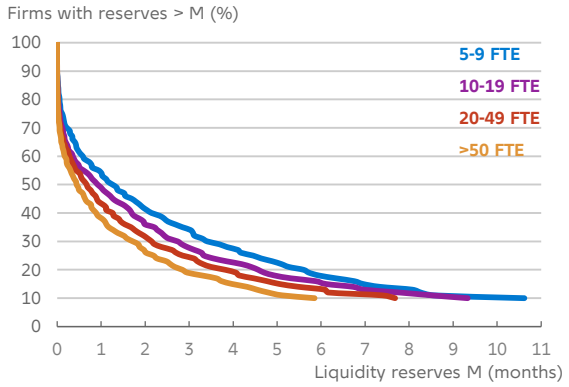
Source: Own calculations based on DST microdata.

Chart 2 illustrates the distribution of liquidity reserves M for the baseline case and several alternative assumptions. The baseline case shows that the median firm has cash reserves for about one month. About one third of firms have almost no liquidity reserves. These firms have to pay their fixed capacity cost out of current revenue flows, and are thus highly vulnerable to a drop in business volume. The chart also includes two sensitivity checks. We first count firms' liquid (i.e. publicly traded) bonds and equity shares as part of their liquidity reserve C. Adding these assets has a negligible impact on the analysis. The amount of liquid bonds and equity shares held by firms is small, and concentrated in firms with large cash holdings. Second, we add short-term receivables minus short-term debt to C. Since some firms have less short-term receivables than debt, C can become negative in this case. We normalise liquidity reserves to zero for such firms. Short-term receivables and debt may be affected by defaults and have a time schedule of payments that may affect M (for example, a firm may run out of cash before its receivables are due for payment). Rather than make assumptions about these two factors, we treat the full undiscounted sum of short-term receivables and debt as a liquid asset that can be drawn upon at any time. While many firms have a healthy amount of outstanding receivables that would substantially increase M, once the debts that firms themselves owe are subtracted, the liquidity situation gets worse rather than better for the median firm.

It is important to point out that our calculations only include internal liquidity reserves but leave out important off-balance-sheet sources of liquidity. First, many firms have already allocated but unused credit lines at their disposal. Second, some types of firms, especially smaller sole proprietorships, may be able to rely on equity injections from owner-managers.

In Chart 3, we present results of the baseline measure of liquidity reserves by firm size. Small firms have higher liquidity reserves than larger firms. In particular, the median firm with more than 50 full-time equivalent employees (FTE) has liquidity reserves for about two weeks, while the median firm with five to nine FTE employees has liquidity reserves for about five weeks. Since smaller firms tend to have more difficulties in accessing credit, such saving behaviour would be expected as a precaution.

Liquidity reserves by firm size Chart 3



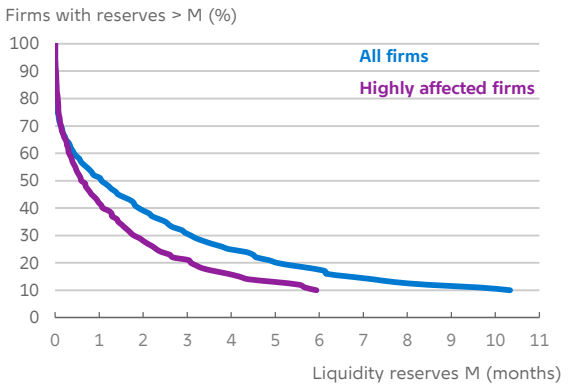
Source: Own calculations based on DST microdata.

Highly exposed sectors

Not all sectors are equally exposed to social distancing measures. While manufacturing sectors may be hit by declines in demand and some productivity losses, the most severe impact should be felt in the service sector and especially by customer-facing service sector firms directly affected by social distancing measures. To address this, we adapt a recent classification of sectors' exposure to social distancing measures by Koren and Pitö (2020). The measure is based on the task content of occupations typically employed in a sector. It first classifies occupations based on their teamwork intensity, customer interaction and physical presence requirements. Second, sector exposure is measured through the share of

employment in occupations with high teamwork or customer interaction components. The measure is based on US data, but it seems reasonable that occupational characteristics and sectoral employment composition are similar in other countries.

Liquidity reserves of highly affected firms Chart 4



Source: Own calculations based on DST microdata.

In Chart 3, we present separate results for firms in the 20 most affected sectors, excluding sectors such as food retailers or pharmacies that are deemed essential and exempt from social distancing measures. Firms in these most affected sectors account for 9.5 per cent of private sector employment, and 7 per cent of total employment. Highly affected sectors have lower liquidity reserves than the overall population of firms. The median firm in highly exposed sectors has liquidity reserves for two to three weeks. This difference is driven by the part of the distribution slightly below and above the median. There is no difference in the lower tail of the distributions, and as in the overall population, about one third of firms have negligible cash reserves.

Characteristics of firms with low reserves

Table 1 describes the characteristics of firms with negligible cash reserves. We compare firms below the 33rd percentile of reserves with firms with higher reserves. Two key differences emerge. First, firms with low reserves are less profitable, have a lower equity ratio and more debt that is mostly short-term. Second, firms with low reserves are more likely to operate in manufacturing sectors. These two differences may result from different mechanisms. One explanation for the worse balance sheet situation of firms with low reserves is that these firms have been hit by adverse shocks in the recent past and have drawn down their liquidity reserves as a result. Manufacturing firms, on the other hand, typically have more collateralisable assets than firms in other sectors, and may rely more heavily on credit lines for liquidity as a result.

It is also important to point out dimensions where no clear (or only small) differences emerge. First, even though firms with low reserves are slightly larger, older and less likely to be startups (age <2 years), the differences in these dimensions are not substantial. Second, firms with no reserves do not have substantially higher or lower fixed capacity cost relative to their sales. The short duration of liquidity reserves thus results from low cash holdings rather than from just a higher fixed capacity cost.

Policy measures

The Danish government has introduced a range of subsidies to address concerns about the liquidity of firms and the potential destruction of productive capacity in Denmark. We assess how these policies may impact the duration of liquidity reserves across the distribution of firms.

Wage subsidies

The most important policy to support firms is a wage compensation scheme. This scheme covers 75 per cent of earnings of salaried employees and 90 per cent of hourly-paid

Characteristics of firms with low liquidity reserves

Table 1

	Upper two terciles	Lowest tercile
Median profit to revenue	0.054	0.031
Median fixed capacity cost to revenue	0.375	0.395
Median inventory to total assets	0.025	0.108
Median real estate to total assets	0.000	0.000
Mean real estate to total assets	0.077	0.094
Median financial assets to total assets	0.006	0.004
Median equity share	0.380	0.255
Median short-term debt share	0.494	0.599
Median long-term debt share	0.000	0.010
Median revenue in kr. 1000	17571	17734
Median employment in FTE	10.12	12.14
Median firm age in years	12	13
Median average wage (Wage bill/FTE)	409	390
Share of manufacturing firms	0.13	0.21
Share of startups (firm age <= 2)	0.05	0.05

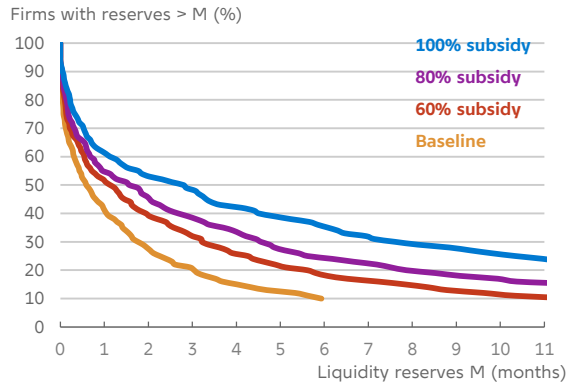
Source: Own calculations based on DST microdata.

employees that would have otherwise been laid off, provided firms refrain from layoffs and satisfy a number of other requirements. Variations of such wage subsidies have also been introduced in other countries, for example short-time work schemes in Germany, Austria and Switzerland.

Firms' wage bills are by far the largest component of fixed capacity cost. To see the impact of such policies on the duration of firms' liquidity reserves, we re-compute the baseline liquidity reserve measure assuming that the government covers 60, 80 or 100 per cent of the overall payroll. The results are illustrated in Chart 5. The percentile plots are not shifted to the right but rather "bent" upward for the upper two terciles of firms. In other words, the wage subsidy extends the duration of liquidity reserves for firms that have reserves, but does not extend the reserves of firms that have no reserves to begin with. With an 80 per cent subsidy, the duration of cash reserves for the median firm almost triples to slightly less than three months. However, even with a 100 per cent subsidy about one third of firms have liquidity reserves for less than one month.

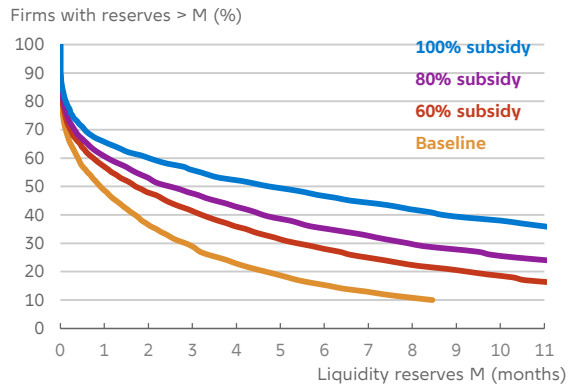
In highly affected sectors (Chart 6), an 80 per cent subsidy more than doubles liquidity

Wage subsidies in highly affected firms Chart 5



Source: Own calculations based on DST microdata.

Impact of wage subsidies on liquidity reserves Chart 7



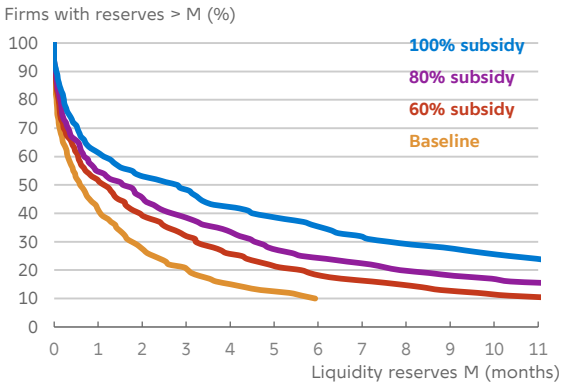
Source: Own calculations based on DST microdata.

reserves of the median firm from two to three to about seven weeks, but the small effect among the bottom 1/3 of the liquidity-constrained firms is reason for concern.

Cost compensation

Another important subsidy meant to address funding shortfalls of Danish firms is a cost compensation scheme. This scheme covers varying shares of all fixed cost, depending on the projected revenue shortfall. For firms that were forced to shut down as a public safety measure, it covers all fixed costs. For firms with a revenue shortfall of more than 80 per cent, the cost compensation scheme covers 80 per cent of costs. In Chart 7, we illustrate the effects of this scheme on our measure, by reducing all components of F to 20 per cent of their baseline value. The effects are similar to those for the wage subsidy: reserves of firms with some liquidity are extended further, but firms with no liquidity still have to rely on external sources of liquidity or scale down in the event of a substantial drop in revenues.

Cost compensation scheme Chart 6



Source: Own calculations based on DST microdata.

Conclusion

We discuss the distribution of internal liquidity reserves of Danish firms during "regular" times. The median firm has internal liquidity reserves covering about one month of fixed capacity cost. About one third of firms have virtually no liquidity reserves. These numbers are slightly higher but overall comparable to the distribution of liquidity reserves in 2007 at the onset of the financial crisis. In sectors especially affected by social distancing measures, the observed internal liquidity situation tends to be worse.

Wage and fixed cost subsidies help to extend the duration of liquidity reserves for firms with some reserves. However, they do not substantially extend reserves of firms that have very small reserves to begin with. The latter firms will have to rely on external liquidity such as loans or credit lines in the event of a sudden stop of economic activity. To prevent defaults or substantial capacity reductions of otherwise healthy and viable firms due to liquidity problems, it is essential that such firms have access to loans or bank credit lines for liquidity management. The latter is more likely when the banking sector is healthy and well capitalised.

REFERENCES

Acharya, Viral and Steffen, Sascha (2020),The risk of being a fallen angel and the corporate dash for cash in the midst of COVID, forthcoming in *COVID Economics*.

Banerjee, Ryan; Illes, Anamaria; Kharroubi, Enisse and Serena, Jose-Maria (2020), Covid-19 and corporate sector liquidity, *BIS Bulletin*, No. 10.

Chodorow-Reich, Gabriel (2014), The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-09 Financial Crisis, *Quarterly Journal of Economics* 129 (1), pp. 1-59.

Koren, Miklós and Rita Petö (2020),Business disruptions from social distancing, *COVID Economics* 1 (2), pp. 13-31.

Zuellig, Gabriel (2020), Heterogeneous employment effects of firms' financial constraints and wageless recoveries, Mimeo, University of Copenhagen, available here: http://gabrielzuellig.ch/wp-content/uploads/2020/05/WagelessRecoveries.pdf

APPENDIX

Statistics Denmark (DST) collects detailed balance sheet information through a survey. The survey includes all firms with more than 50 FTE employees and a random sample of smaller firms. The random sample includes 50 per cent of firms with 20 to 49 FTE employees, 20per cent of firms with 10 to 19 FTE employees and 10per cent of firms with five to nine FTE employees. Firms with less than five employees are not included in the survey. For some of these firms, DST obtains partial balance sheet information from SKAT, but this information does not cover some variables required for this analysis and we exclude all of them. Finally, some sectors are excluded from the FIRE database ex-ante. Important sectors that are left out are agriculture and most of the financial sector. We apply sampling weights to make the results representative of the population of firms with more than five FTE employees in included sectors. These firms cover about 56 per cent of private sector employment in Denmark and 41 per cent of overall employment.

Ideally one would use balance sheets from 2019, but unfortunately 2016 is the last year for which FIRE microdata is currently available. However, the distribution of liquidity to fixed capacity cost is fairly stable over time as illustrated in Chart 1. This chart plots the ratio of cash holdings to firms' wage bill over time – some more disaggregated balance sheet variables are not available before 2009, which is why we show results for this ratio rather than C/F as illustrated in Chart 2. As a result, the 2016 data can still provide valuable insights about liquidity reserves during regular times.

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