WORKING PAPER

DANMARKS NATIONALBANK

30 NOVEMBER 2021 — NO. 184

Firm financing and public support measures during the pandemic

Ida Rommedahl Julin
irj@nationalbanken.dk
DANMARKS NATIONALBANK

Alexander Meldgaard Otte
almo@nationalbanken.dk
DANMARKS NATIONALBANK

Andreas Kuchler
aku@nationalbanken.dk
DANMARKS NATIONALBANK

Firm financing and public support measures during the pandemic

Abstract
This paper studies Danish non-financial firms' debt financing decisions during covid-19 with a focus on the impact of government support measures. The growth in credit from banks and mortgage banks to firms has been modest during the pandemic, and many firms reduced their debt level in the initial phases. Firms that were more exposed to the pandemic had higher debt growth than other firms. That was in particular the case for those with weaker pre-pandemic balance sheets. Public liquidity measures such as deferred tax and VAT payments served as a substitute for more traditional debt funding sources during the pandemic. There are indications that firms that were weaker even before the pandemic have received a disproportionately high share of tax and VAT loans. These results suggest that there may be substantial costs and risks associated with such support measures. We find no differences in debt developments between firms receiving and those not receiving benefits from the wage and fixed cost compensation schemes.

Resume
Dette arbejdspapir analyserer ikke-finansielle virksomheders gældsfinansieringsbeslutninger under covid-19 med særligt fokus på betydningen af offentlige støtte- og likviditetsordninger. Væksten i kredit fra banker og realkreditinstitutter til virksomhederne har været beskeden under pandemien, og mange virksomheder reducerede deres gæld i begyndelsen. Virksomheder, der var eksponeret overfor pandemien, havde højere gældsvækst end andre virksomheder. Det gjorde sig særligt gældende for dem, der havde dårligere nøgletal inden pandemien. Offentlige likviditetsstøtte-ordninger, såsom udskudt skat og moms, fungerede som substitut for mere traditionel gældsfinansiering under pandemien. Der er tegn på, at virksomheder, der var svage allerede inden pandemien, i særlig grad har benyttet sig af skatte- og momslån. Det indikerer, at der er betydelige omkostninger og risici ved sådanne støtteordninger. Vi finder ingen forskel i kreditudviklingen mellem modtagere af kompensation (lønkompensation og kompensation for faste omkostninger) og øvrige virksomheder.

Key words
Economic activity and employment; public finances and fiscal policy; financial assets and balances.

JEL classification
E61; E65; G21; G28; G30; H12; H32.

Acknowledgements
The authors wish to thank the Danish Tax Agency and the Danish Business Authority for provision of data, as well as colleagues from Danmarks Nationalbank, in particular Søren Lejsgaard Autrup, Simone Maria Bonin, Dominic Cucic, Thomas Harr, Martin Nygaard Jørgensen and Martin Oksbjerg, for useful comments and discussions.

1. Introduction

How did firms' financing decisions respond to government support measures introduced during the covid-19 pandemic? This question is important both for assessing the short- and medium-term financing situation of firms, and for the design of future government support measures. A wide range of fiscal measures to support firms were introduced in different countries to counteract the imposed restrictions as well as the slowdown in demand during the pandemic (OECD, 2020). Denmark was one of the countries that introduced large support packages in the form of liquidity measures, in particular when measured in terms of actual usage (rather than potential use) and in comparison to the size of the slowdown (measured *ex post*). Compensation schemes were used to a smaller extent in Denmark than in other countries (Jensen et al., 2020).[1] A large part of the measures imposed in Denmark could be expected to have a direct impact on credit demand, since they were focused on either supporting the operation of the firms or liquidity provision. Credit demand among firms in Denmark was relatively low and relatively few firms reported that access to finance was a major problem during the pandemic, compared to firms in other countries.[2] The large focus on liquidity measures makes Denmark an interesting country in which to study the effects of such measures on the financing decisions of non-financial companies.

Our aim is to understand financing decisions along the distribution of firms on different dimensions. Most firms in Denmark are small- and medium-sized enterprises (SMEs). The external financing of SMEs in Denmark relies to a large extent on debt financing from banks and mortgage banks rather than market-based financing such as issuance of corporate bonds or equity financing by share issuances (Abildgren et al., 2014). In this paper, we restrict our focus to debt financing of enterprises (excluding sole proprietorships) from banks and mortgage banks (hereafter "MFIs")[3]. Thus, our results will, in particular, reflect the financing behaviour of SMEs.[4]

We document several important trends. First, firms on average decreased their level of debt to MFIs during 2020, largely supported by government support schemes.[5] At the industry level, fewer firms in industries that were more exposed to the pandemic took up additional credit during the pandemic compared to firms in less exposed industries. However, using firm-level data and controlling for a range of factors, in particular industry and balance sheet indicators, we find that firms that were more exposed to the pandemic (i.e. firms that experienced a large drop in value added) had higher credit growth than other firms. In addition, large firms that already before the pandemic had high leverage and smaller firms with low liquidity had a higher credit

1 The potential costs of the compensation and liquidity measures were not known at the time they were implemented. Compensation schemes were generally expected to have higher costs than liquidity measures, in part because wage and fixed cost compensation were not to be repaid.

2 See figures in Appendix A.

3 "MFI" is short for Monetary and Financial Institutions excluding Danmarks Nationalbank, i.e., Danish banks and mortgage banks.

4 We disregard sole proprietorships due to a lack of data on their financial accounts in Bisnode. In addition, the financial situation of sole proprietorships can be difficult to disentangle from the private financial situation of the person owning the company, which could potentially distort the analysis.

5 Credit growth is measured from end-2019 to end-2020 since we rely on quarterly data at the firm level and because the outbreak of the pandemic potentially already affected credit developments during the 1st quarter 2020.

growth than other firms, also when controlling for the size of the shock to value added at the firm level. The fact that more vulnerable firms had higher credit growth than other firms could indicate that the crisis amplified pre-crisis weaknesses.[6]

Of the introduced government support measures, deferred tax and VAT payments had the largest direct impact on firms' financing decisions during the pandemic. Firms that received more liquidity through deferred tax and VAT payments exhibited lower credit growth than other firms, indicating that the introduction of liquidity measures contributed to reducing firms' immediate credit demand during the pandemic. In addition to postponing the deadlines for tax and VAT payments, some (mainly smaller) firms had the opportunity to apply for an interest-free tax loan during the spring of 2020. In 2021, deadlines for tax payments were generally not postponed further, but instead a more general lending scheme in the form of tax and VAT loans was introduced for all firms satisfying some rather basic criteria.[7] Data on the usage of these tax and VAT loan schemes show that firms with low liquidity or high leverage, as well as firms that were already in default[8] on an existing bank or mortgage loan were more likely to apply for a tax loan.[9] This indicates that the government has assumed a substantial uncompensated credit risk by offering interest-free tax loans to many firms almost irrespective of their creditworthiness.[10] In addition, such measures inherently come with a risk of keeping alive low-productivity firms that would otherwise have closed.[11] The introduction of liquidity measures was surely justified by the extraordinary situation brought about by the pandemic and has likely helped supporting many firms' immediate liquidity needs.

Another important type of public support measure introduced during the pandemic was compensation schemes, in particular wage and fixed cost compensation. Compensation was essentially a grant to support the firms' operations, while the liquidity measures were in the form of loans. Apart from this, one of the most important differences between compensation and liquidity measures was that the compensation measures were targeted while liquidity measures were available for all firms, by and large.[12] We find no differences in debt financing behaviour between recipients and non-recipients of wage and fixed cost compensation. This could indicate that

6 Evidence from Germany shows that firms, which appeared weak before the crisis, were hit harder by the pandemic, and, on top of the initial impact, expected more difficulties for their businesses going forward (Buchheim et al., 2020).

7 Firms were not subject to a traditional assessment of their creditworthiness by the government. However, they had to satisfy a few criteria in order to be eligible for the tax loans. Firstly, during the last three years the firm should have reported its tax information to the tax authority in a sufficient manner. Secondly, the owner or the management must not have been indicted for tax fraud within the last 10 years. Thirdly, firms could not get a tax loan if they were already defaulting on their tax payments, being liquidated or the like. Lastly, in the case where the firm already had an outstanding debt with the government, the liquidity originating from the tax loan would automatically pay down that debt of the firm first. Read more on website of the Danish Tax Agency, see for instance here and here (in Danish only).

8 Firms are considered in default if the bank or mortgage credit institution assess that repayment of debt is unlikely without e.g. realising collateral or if the firm has at least one loan in arrears for more than 90 days.

9 This is in line with evidence from Switzerland, where indebted firms have also been found to be more likely to take corona-related loans provided by the government (Brülhart et al., 2020).

10 See footnote 7 for a description of eligibility criteria for tax loans.

11 The share of these firms, so-called zombie firms, has generally been low in Denmark in the years leading up to the pandemic (Andersen et al., 2019). Dynamic allocation of resources across firms is normally an important driver of productivity growth in Denmark (Bess et al, 2020).

12 Liquidity measures became available for different firms at different points in time, cf. Table 1. However, the pre-condition for obtaining such liquidity support was naturally that the individual firm had a payment to defer, i.e.., was due to pay taxes on behalf of their employees, or VAT.

such measures were successful in supporting the operations of the firms during the pandemic, while at the same time not distorting firms' financing conditions materially by providing abundance of compensation.[13]

The paper proceeds as follows. In the next section, we will give an overview of the liquidity and compensation measures that we study in this paper, as well as introduce the data. Section 3 provides an analysis of credit developments during the pandemic at the aggregate level, as well as of firm-level determinants. In section 4, we consider the impact of public liquidity measures on debt financing behaviour at the firm level and analyse the determinants of applying for tax loans and paying taxes early. Section 5 briefly compares debt financing behaviour for firms that were subject to wage and fixed cost compensation with the behavior of other firms, while section 6 provides some concluding remarks.

2. Public support measures and data

Following the onset of the pandemic, the Danish government, along with governments in many other countries, relatively quickly introduced a range of measures to support firms that were subject to lockdown or large drops in demand. The aim of the schemes was to assist firms in weathering the shock and preserving employer-employee relationships. In this paper, we consider the impact of compensation schemes and liquidity measures on the financing situation of firms. An overview of these measures is provided in Table 1. In addition to these measures, the government also provided support in the form of, e.g., loan guarantees, which are not covered by the analysis in this paper.[14]

The basis for our analysis is the credit register at Danmarks Nationalbank, where we have data on the universe of loans to non-financial companies from Danish banks and mortgage banks. In this paper, we restrict the focus to firms that are financed by Danish banks or mortgage banks and that are not sole proprietorships. Furthermore, in most applications, we drop observations in the lowest quartile of debt in order to avoid excessive influence of firms with small loans on, for instance, the calculation of credit growth rates and other types of irregular behaviour.[15]

[13] To rule out any distortions, an investigation would also have to consider if firms instead of reducing debt then, e.g., ended up having excess liquidity or transferred the proceedings to the owners.

[14] The possibility for creditworthy firms to obtain a state-guarantee through Vækstfonden and EKF Denmark's Export Credit Agency was not used to a large extent, and state-guarantees are thus not covered by this paper. From the outbreak of the pandemic and until September 2020, banks provided loans for kr. 9 billion supported by state-guarantees (Danmarks Nationalbank, 2020b). The allocated limit was about kr. 70 billion (Danmarks Nationalbank, 2020a).

[15] Firms in the lowest quartile of debt have only a negligible level of debt (less than kr. 2,777) outstanding. We exclude observations based on this criterion as of end-2019, as well as we restrict the sample to firms observed in the credit register in all quarters between 4th quarter of 2019 and 4th quarter of 2020.

Table 1: Danish covid-19 support measures for firms considered in this paper

Support measure	Availability	Coverage
Compensation schemes		
Wage compensation	Forced lockdown of firms' activities; or at least 30% or 50 workers sent home, and no employees terminated	75-90% of wages, subject to a cap
Compensation of fixed costs	Firms subject to restrictions (e.g. forced closure, limited opening hours, assembly ban, border closures, travel restrictions)	50% of certain types of fixed costs; subject to a cap for some types of costs
Liquidity measures		
Extension of deadlines for payment of taxes (e.g. income taxes paid on behalf of employees)	All firms	Various extensions (up to seven months; depends on firm size)
Extension of deadlines for payment of VAT	All firms	Length of extension depends on firm size
Tax lending schemes (VAT, payroll tax and tax loans)	Some SME's could apply in 2020, all firms in 2021	Loan amount equivalent to one or more payments of VAT, payroll tax, or tax on behalf of employees

Note: Based on information from government websites and The Danish Tax Agency (2021).

In addition to the credit register, we have obtained data on the use of compensation schemes from the Danish Business Authority (Erhvervsstyrelsen), and data allowing us to estimate the impact of liquidity measures from the Danish Tax Agency (Skattestyrelsen). These data are obtained at the level of individual firms, and the firm-level identifier allows us to merge the datasets with data from the credit register, as well as accounting information from Bisnode A/S allowing us to link with pre-pandemic balance sheet information (we use balance sheet information from the most recent firm accounts completed before 1 March 2020, in most cases for 2019). From the Danish Tax Agency, we have obtained data on all firms' tax and VAT reportings and payments for each month in the period 2019-2021. This allows us to calculate a measure of the liquidity effect of extended tax and VAT deadlines for each firm. To be more specific, we estimate the liquidity effect for each firm at the end of 2020 using information on reported tax and VAT for the months for which tax and VAT deadlines were extended during 2020 to a deadline in 2021. Firms had the opportunity to pay their taxes earlier than the extended deadline by depositing the amount (or, in fact, any amount) in the firm's so-called tax account at any time before the extended deadline. Most of the extended tax and VAT payments were due in 2021, where the general extensions of payment deadlines were to a large extent replaced by the introduction of a tax and VAT loan system available for most firms. In this system, firms had to pay tax by default and actively apply if they wanted to take out a loan, whereas the default setup in 2020 was that deadlines were extended, and firms had to actively deposit their tax payments earlier than the extended deadlines if they wished. We

have obtained firm-level information on early payments to tax accounts, as well as information from the Danish Tax Agency regarding which firms used tax and VAT loans during this period. An overview of the central variables of the analysis in this paper, as well as descriptive statistics, can be found in Table 2.

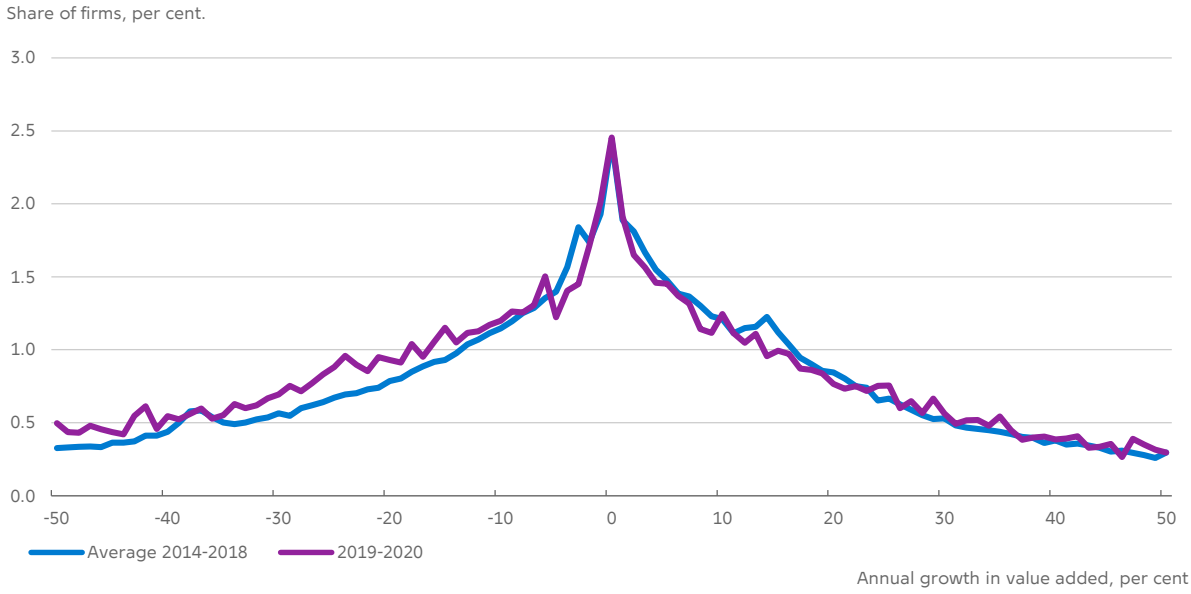
To obtain a measure of the extent to which a firm has been exposed to the pandemic, we use the VAT reportings to estimate the change in value added from 2019 to 2020. The net sum of all VAT reportings (VAT on sales minus VAT on purchases) over a given year can be used to construct a good measure of value added, although issues related to periodisation of payments can be a potential source of error.[16] The distribution of this measure of changes in value added is depicted in Figure 1, along with a historical benchmark based on firm accounts statistics compiled by Statistics Denmark. The distribution is located somewhat more to the left compared to the distribution in 2014-2018, which is exactly what should be expected in a year in which firms in some industries were exposed to a large negative shock, and other (but fewer) firms in other industries experienced a positive shock.[17] Value added dropped by more than 10% from 2019 to 2020 in 43% of the firms in our sample, whereas it increased by more than 10% in 35% of the firms. In the benchmark period, 2014-2018, the corresponding shares were 33% and 39%, respectively.

[16] The value added of the firm is estimated by the net sum of VAT reportings divided by the VAT rate (25 per cent in the case of Denmark). Using the net sum of VAT payments as our measure of the impact of the shock at the firm level implies that we account for not only changes in sales but also the extent to which firms may have responded by altering their purchases.

[17] The distribution is less skewed, however, than the distribution of expected changes in revenues as reported by firms surveyed in April-June 2020 (Bennedsen et al., 2020). The difference could for example reflect expectations being inaccurate, firms having been too pessimistic compared to the *ex-post* outcomes, or differences in concepts used (value added vs. changes in revenues).

Distribution of changes in value added from 2019 to 2020 compared to the average distribution in 2014-2018

Figure 1



Note: The distribution of changes in value added from 2019 to 2020 is based on the estimation sample used in the rest of the paper. The average distribution from 2014 to 2018 is based on Statistics Denmark's Firm Accounts Statistics for the non-primary and non-financial companies. In both cases, firms in the lowest quartile of debt have been excluded. The estimation of value added is based on the VAT reported by the individual companies. Revisions to reported VAT after the end of the reference period may not be completely covered.

Source: Own calculations based on firm level data from the Danish Tax Agency and Statistics Denmark.

Table 2: Variables and descriptive statistics

Variable	Definition	Source	Mean	SD	1st quartile	Median	3rd quartile	N
Debt growth rate	Growth rate in debt, Dec. 2019 - Dec. 2020, %	Danmarks Nationalbank, credit register	-3.46	22.72	-12.86	-4.70	-0.12	54,844
Debt uptake	Dummy for firms having increased their debt level	Danmarks Nationalbank, credit register	0.23	0.42	0.00	0.00	0.00	72,004
Credit line growth rate	Growth rate in credit lines (used and unused), Dec. 2019 - Dec. 2020, %	Danmarks Nationalbank, credit register	-2.25	20.16	-8.39	-2.93	0.00	64,941
Increase credit line	Dummy for firms having increased credit lines (used and unused), Dec. 2019 - Dec. 2020	Danmarks Nationalbank, credit register	0.21	0.41	0.00	0.00	0.00	72,004
Increase credit line but not debt	Dummy for firms having increased credit lines but not debt, Dec. 2019 - Dec. 2020	Danmarks Nationalbank, credit register	0.04	0.21	0.00	0.00	0.00	72,004
Total assets	Total assets of the firm (kr. million)	Bisnode	156.64	16,047.96	2.71	7.68	24.21	52,504
Leverage ratio	Debt / total assets	Bisnode	0.65	0.24	0.50	0.69	0.84	52,323
Cash ratio	Liquid assets / short term liabilities	Bisnode	1.46	26.98	0.00	0.06	0.54	51,906
Growth in value added, 2019-20	Growth in value added imputed from VAT-reportings (see main text for details), %	Own calculations based on data from the Danish Tax Agency	20.92	8,469.63	-39.70	-2.55	25.24	47,231
Deferred tax / total assets	Deferred tax and VAT at the end of 2020 (imputed based on tax and VAT reportings) in per cent of total assets	Own calculations based on data from the Danish Tax Agency	8.91	90.02	0.44	2.60	10.22	43,713
Prepaid tax	Indicator for firms having prepaid tax (having a positive amount in their tax account) at least once during the pandemic	Own calculations based on data from the Danish Tax Agency	0.18	0.38	0.00	0.00	0.00	38,457
Applied for tax loan	Indicator for firms having taken at least one tax loan during the pandemic	Own calculations based on data from the Danish Tax Agency	0.24	0.43	0.00	0.00	0.00	38,256
Received wage or fixed cost compensation	Indicator for firms having received wage or fixed cost compensation at least once during the pandemic	Own calculations based on data from the Danish Business Authority	0.14	0.35	0.00	0.00	0.00	72,566

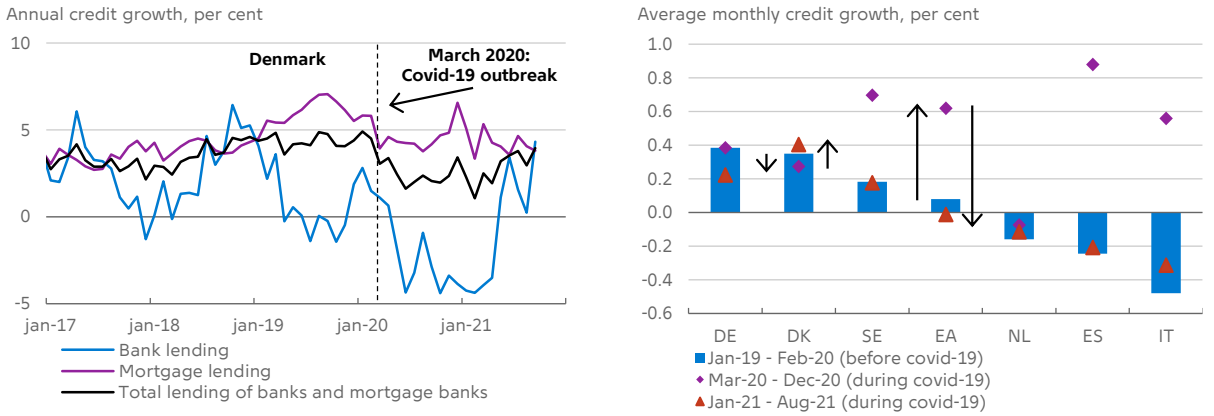
Notes: The descriptive statistics are based on firms which are observed in the credit register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded. The growth rates in debt and credit lines have been truncated to values between -50% and +100% in all analyses in this paper where these variables are considered.

3. Firm financing and credit developments during covid-19

In Denmark, aggregate credit growth to non-financial companies declined at the outbreak of the pandemic. The stock of bank loans fell, whereas the growth in mortgage credit was slightly lower than before, but still positive, cf. Figure 2 (left). This decline in overall credit growth was generally in contrast to many other countries, cf. Figure 2 (right), and in contrast to banks' own expectations. In the euro area, credit growth increased sharply in 2020 following the outbreak of covid-19. During 2021 – a year characterised by a second covid-19 wave in the 1st quarter and since then a strong economic recovery – aggregate credit growth to firms has returned somewhat to its pre-covid-19 levels in many European countries.

The focus of this paper is to analyse the drivers of borrowing patterns at the firm level in Denmark during 2020, i.e. during the core of the covid-19 crisis, as well as to examine the use of public support measures introduced throughout the pandemic. Denmark was one among only a few countries having a decline in the growth of credit during 2020. Evidence suggests that the lower credit growth in Denmark should primarily be seen in the light of lower borrowing needs compared to firms in other European countries (Jensen et al., 2020). There was a significantly lower share of firms increasing their debt during the pandemic compared to preceding years, cf. below. Besides the role of government support measures, the economic contraction was less severe in Denmark and Danish firms had built up reserves to a larger extent than firms in other countries prior to the first covid-19 outbreak (Jensen et al., 2020; Danmarks Nationalbank, 2021a).

Growth in credit to non-financial companies in Denmark and other areas Figure 2



Note: Loans from banks and mortgage banks in all currencies to non-financial companies. The figure on the right depicts total MFI credit, i.e. credit from banks and mortgage banks for different countries as well as for the euro area ("EA"). Arrows in the right figure indicate the movements in credit growth. The euro area experienced an initial increase followed by a decline, in contrast to Denmark.
Source: Own calculations based on data from Danmarks Nationalbank and Macrobond.

The credit demand of a firm reflects its demand for liquidity (as well as its desired financing structure). Changes in credit demand may reflect the types of shocks and conditions that firms face. For example, an

increase in credit demand can reflect that the firm is expanding and needs financing to increase investments or expand day-to-day operations. However, an increase in credit demand could also reflect that the firm has experienced a negative demand shock and needs additional financing to help weathering the shock. Going into the covid-19 crisis, firms had different preconditions such as different cash buffers, and they were also exposed differently to the covid-19 shock. Some firms experienced a positive demand shock, while most firms experienced a reduction in demand and generally increased uncertainty[18]. It could therefore be expected that many firms would have increased their credit demand in order to meet financing needs focused on weathering the shock (e.g. emergency financing). Shocks to firm inputs have also been considerable for some firms during the pandemic, which could both have reduced their investment opportunities and increased their demand for emergency financing.

As already noted, MFI credit growth in Denmark declined when covid-19 broke out. Combined with survey evidence suggesting no tightening of credit standards, the decline in credit growth indicates that the need for emergency MFI credit played only a muted role at the aggregate level. The 25 per cent of firms being hit the hardest by the pandemic (measured by the yearly change in value added in 2020) accounted for only roughly the same share (29 per cent) of the increase in total credit among firms which increased their debt level. Moreover, Danish firms that received public compensation while being severely affected by restrictions only represented roughly 15 per cent of the stock of bank loans to firms in 2020 (Danmarks Nationalbank, 2020c). Hence, the potential increase in aggregate credit growth would be limited even if this small share of firms had increased borrowing substantially.

Moreover, the deteriorated macroeconomic outlook during 2020 possibly decreased the need for financing of new investment projects for many firms, further contributing to a reduction in credit growth. However, the uncertainty induced by the covid-19 shock did prompt around 10 per cent of Danish firms to actively negotiate increased credit lines with their banks to secure access to emergency liquidity, if necessary. This was particularly pronounced for larger firms as measured by the size of their balance sheets. The share of firms that increased their credit lines was almost twice as high for firms in the top balance sheet quartile compared to the bottom quartile (around 15% and 8%, respectively). However, these credit lines were to a large extent non-utilised and consequently did not contribute to the aggregated credit statistics.[19] In fact, half of the firms that negotiated higher credit lines decreased their debt at the same time. This may reflect that Danish firms were incentivised to increase credit lines rather than actual credit since firms' deposit rates, in general, are negative in Denmark while banks charge a positive lending rate.[20] Secondly, the low rate of utilisation may reflect that

18 See for example Pellegrino et al. (2021).

19 Firms' undrawn credit facilities at the banks have remained at a high level during the pandemic (Danmarks Nationalbank, 2021c).

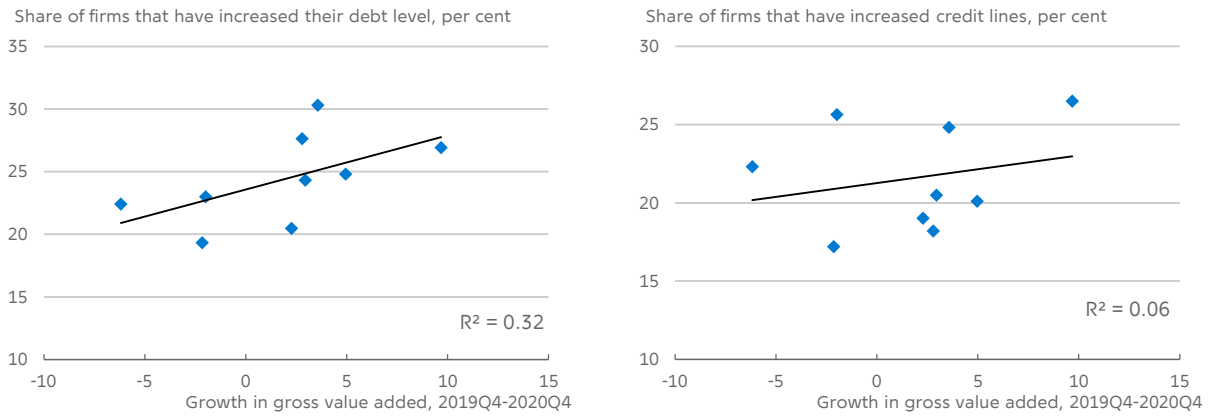
20 In principle, the incentive to increase debt relative to holding deposits depends on the spread between the deposit and lending rates, and not on the sign of the deposit rate in itself. However, there is evidence that firms reduce their debt level and their level of deposits when faced with negative deposit rates (Abildgren and Kuchler, 2020).

some of these firms were less adversely affected by the pandemic than they originally expected. This would be in line with the Danish economy having performed better during the pandemic than expected by most forecasters at its onset.[21]

To enhance our understanding of the credit developments during the pandemic, we first consider developments at the industry level, before turning to the micro-level data. A smaller share of firms in the industries that were most directly exposed to the covid-19 pandemic increased their debt level, compared to firms in industries that were not exposed to the pandemic to the same extent, cf. Figure 3 (left). This could reflect that credit demand generally has been driven by investment demand while the government support schemes have been effective in reducing the need for emergency financing among firms that were hard hit by the pandemic. It could also reflect negative supply shocks to firms' input, or a tightening of banks' credit standards and/or diversion of funds towards industries that were growing during the crisis. However, as mentioned above and below, there are no indications that credit standards have been tightened. At the industry level, there is no clear relation between direct exposure to the pandemic and the share of firms that have increased their credit lines, cf. Figure 3 (right).

Uptake of debt and credit lines across industries

Figure 3



Note: Gross value added measured in fixed prices, seasonally adjusted. Credit lines is the sum of debt and unused credit lines.
Source: Own calculations based on data from Danmarks Nationalbank and Statistics Denmark.

Despite the fact that the aggregate stock of bank and mortgage loans increased during 2020, we find that firms on average decreased their debt level.[22] Taking a closer look at the firm level data, we find that firms with high liquidity before the pandemic had reduced their debt level to a larger extent than other firms during the pandemic, cf. Figures 4 and 5. Firms with more sparse liquidity (i.e. those in the lowest quartile of cash ratio)

[21] According to current data, the annual growth rate in Danish real GDP was -2.1 per cent in 2020 compared to Danmarks Nationalbanks' expectation of between -10 and -3 per cent at the onset of the pandemic (Danmarks Nationalbank, 2020d).

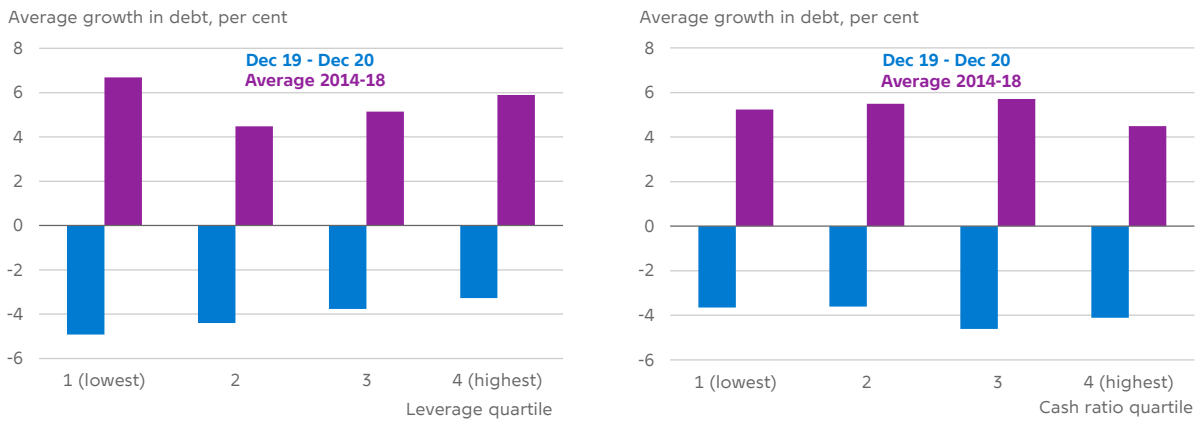
[22] This is not inconsistent since the average firm in Denmark is a smaller firm. By calculating the (unweighted) average growth rate across firms, smaller firms are assigned a larger weight compared to the calculation of the aggregate credit growth. The latter corresponds to a loan-size weighted credit growth.

did not reduce their debt level to the same extent, and a larger share of those firms increased their debt level during the pandemic. This latter pattern is somewhat in contrast to corporate finance dynamics in the pre-covid period (2014-18), where highly liquid firms (i.e. firms in the highest quartile of cash ratio) were more likely to increase their debt levels compared to firms with sparser liquidity. We find similar patterns in terms of leverage. Firms with high leverage did not reduce their debt level to the same extent as firms with lower leverage (Figure 4).

In terms of the share of firms that increased their debt level, we find no clear relation to leverage, but in the pre-covid-19 period, firms with low leverage were more likely to increase their debt level. Firms with low leverage could, all other things equal, be expected to have easier access to finance than firms with higher leverage due to higher credit quality. The fact that these more solid firms do not increase their debt level to the same extent as in the pre-covid-19 period is likely to indicate that the reduced debt level is, to a large extent, driven by a reduced willingness to invest due to increased uncertainty regarding future demand.

Firm characteristics and debt growth during covid-19

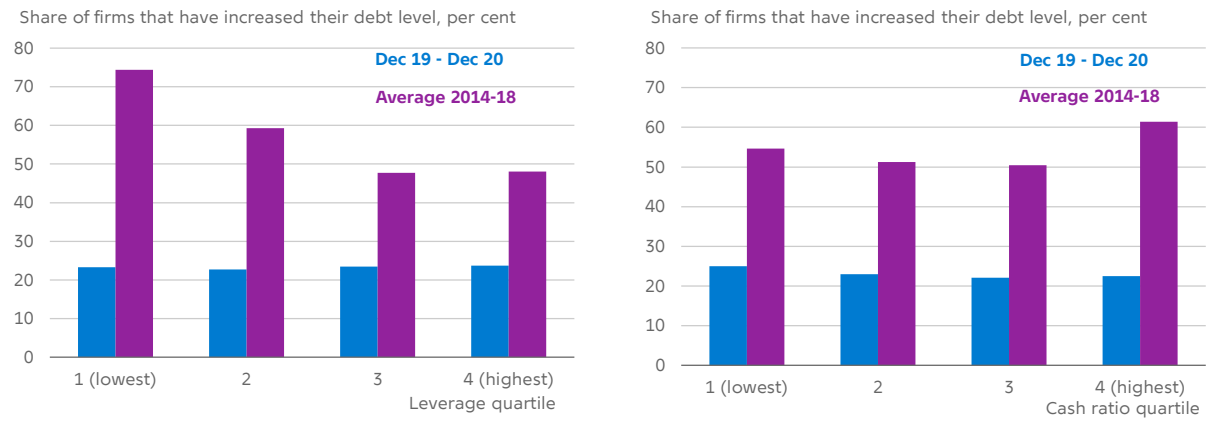
Figure 4



Note: Data represented by the blue bars are based on Danmarks Nationalbank's credit register, and include all firms observed in the register in all quarters between December 2019 and December 2020. Data represented by the purple bars are based on firm accounting data from Bisnode. In both cases, firms in the lowest quartile of debt have been excluded.
Source: Own calculations based on data from Danmarks Nationalbank and Bisnode.

Firm characteristics and the propensity to increase debt

Figure 5



Note: Data represented by the blue bars are based on Danmarks Nationalbank's credit register and include all firms observed in the register in all quarters between December 2019 and December 2020. Data represented by the purple bars are based on firm accounting data from Bisnode. In both cases, firms in the lowest quartile of debt have been excluded.

Source: Own calculations based on data from Danmarks Nationalbank and Bisnode.

In light of the increased uncertainty introduced by the pandemic, a substantial share of firms has secured emergency funding in the form of increased credit lines. In contrast to the actual uptake of credit, which in particular took place in industries hit less hard by the pandemic, there was no relation between increases in credit lines and industry, cf. Figure 3 (right). However, there is a clear relation between balance sheet indicators, such as leverage and liquidity, and the tendency to increase credit lines. Specifically, we find that firms with high leverage and firms with few liquid assets were more likely to increase their credit lines than other firms, cf. Figure 6. Some firms may also have increased their credit lines as a precautionary measure following the increase in uncertainty at the onset of the pandemic. If we focus on firms that have increased their credit lines but not their debt level, it is clear that liquidity is the strongest predictor. The least liquid firms have been much more likely to increase unused credit lines than other firms (Figure 7).

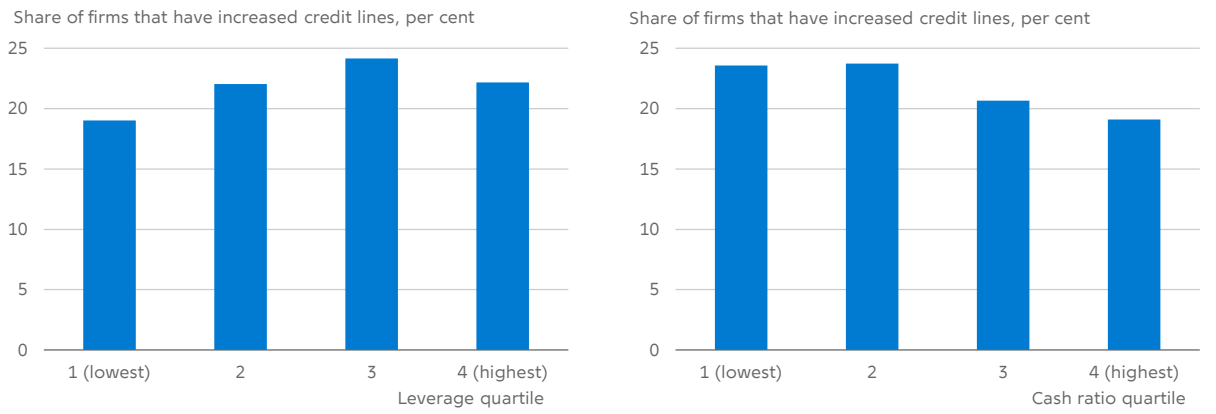
Table 3: Regression models: Debt and credit lines

Dependent variable		(1) Debt growth rate	(2) Dummy debt uptake	(3) Credit line growth rate	(4) Dummy increase credit line	(5) Dummy increase credit line but not debt
			All firms			
Leverage	2nd quartile	0.884*	0.00489	0.859**	0.0241***	0.00339
	3rd quartile	1.126**	0.00773	1.360***	0.0393***	0.00930**
	4th quartile	0.781	0.00334	0.376	0.0120*	-0.0110***
Cash ratio	2nd quartile	-0.186	-0.0121**	-0.463	0.00374	0.00406
	3rd quartile	-0.683*	-0.0165***	-2.387***	-0.0261***	-0.0232***
	4th quartile	-0.122	-0.0153**	-2.196***	-0.0372***	-0.0280***
Value added growth[1]	2nd quartile	-3.888***	-0.0758***	-1.898***	-0.0523***	0.00913***
	3rd quartile	-5.029***	-0.105***	-2.409***	-0.0675***	0.0103***
	4th quartile	-1.877***	-0.0509***	-0.259	-0.00739	0.0163***
Controls		Yes	Yes	Yes	Yes	Yes
No. of obs.		29,161	42,116	37,409	42,116	42,116
			Large firms			
Leverage	2nd quartile	1.120**	0.00665	1.360***	0.0263***	0.00511
	3rd quartile	1.275**	0.0134	2.007***	0.0520***	0.0147***
	4th quartile	1.220**	0.00927	1.127**	0.0195**	-0.0105**
Cash ratio	2nd quartile	0.275	-0.00797	0.192	0.00224	0.00348
	3rd quartile	0.709	-0.00706	-1.061**	-0.0247***	-0.0215***
	4th quartile	1.434**	-0.00824	-0.766	-0.0377***	-0.0285***
Value added growth[1]	2nd quartile	-4.095***	-0.0805***	-2.236***	-0.0607***	0.00747
	3rd quartile	-5.213***	-0.116***	-3.062***	-0.0878***	0.00835*
	4th quartile	-1.705***	-0.0548***	-0.355	-0.0169**	0.0157***
Controls		Yes	Yes	Yes	Yes	Yes
No. of obs.		18,802	25,378	22,514	25,378	25,378
			Small firms			
Leverage	2nd quartile	0.976	0.00941	0.355	0.0295***	0.00417
	3rd quartile	1.522	0.0107	0.785	0.0334***	0.00727
	4th quartile	1.213	0.0181*	0.166	0.0315***	0.00002
Cash ratio	2nd quartile	-1.191	-0.0226***	-1.748***	-0.00363	0.000859
	3rd quartile	-2.594***	-0.0272***	-4.013***	-0.0203**	-0.0231***
	4th quartile	-1.954**	-0.0202**	-3.795***	-0.0252***	-0.0229***
Value added growth[1]	2nd quartile	-3.359***	-0.0708***	-1.411***	-0.0444***	0.00889*
	3rd quartile	-4.774***	-0.0921***	-1.609***	-0.0469***	0.00686
	4th quartile	-1.725**	-0.0428***	0.126	0.00964	0.0174***
Controls		Yes	Yes	Yes	Yes	Yes
No. of obs.		10,359	16,738	14,895	16,738	16,738

[1]Value added growth is measured as the growth in estimated value added (based on VAT reportings) from 2019 to 2020. Note: Large firms are firms with a balance sheet larger than the median (5,215,000 kr.), and small firms are firms with a balance sheet up to and including the median. Control variables are industry fixed effects (2 digit) as well as the level of debt in the 4th quarter of 2019. Data are based on Danmarks Nationalbank's credit register, merged with accounting data from Bisnode, and include all firms, which are observed in the register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.

Increase in credit lines and firm characteristics

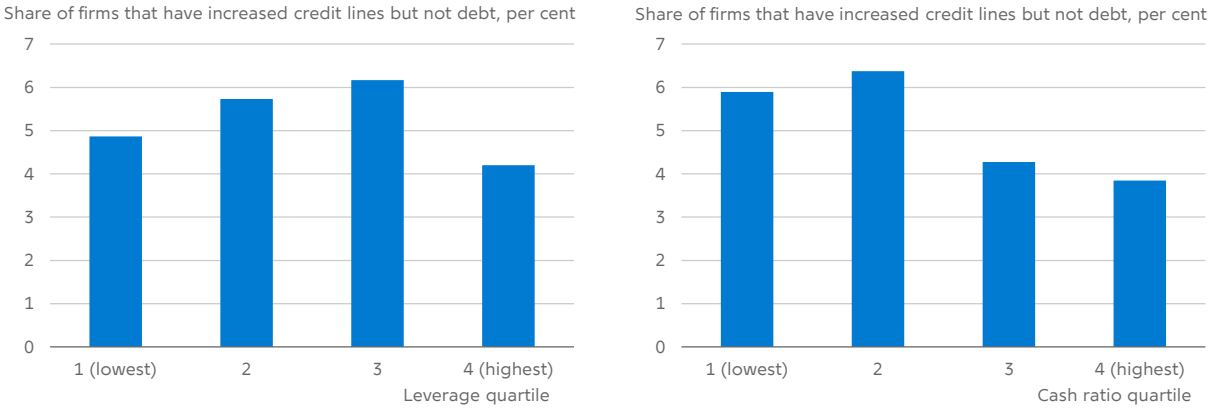
Figure 6



Note: Credit lines is the sum of debt and unused credit lines. Data are based on Danmarks Nationalbank's credit register and include all firms observed in the register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.
Source: Own calculations based on data from Danmarks Nationalbank and Bisnode.

Firms that increase credit lines but not debt

Figure 7



Note: Data are based on Danmarks Nationalbank's credit register and include all firms observed in the register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.
Source: Own calculations based on data from Danmarks Nationalbank and Bisnode.

In Table 3, we extend the bivariate results with a number of regressions, in which we take the different dimensions into account simultaneously. Importantly, we take into account the extent to which the firm was actually exposed to the crisis in the shorter term, proxied by the growth in value added imputed from the tax data, as well as industry-fixed effects. In addition to testing the graphical results, we split by firm size to

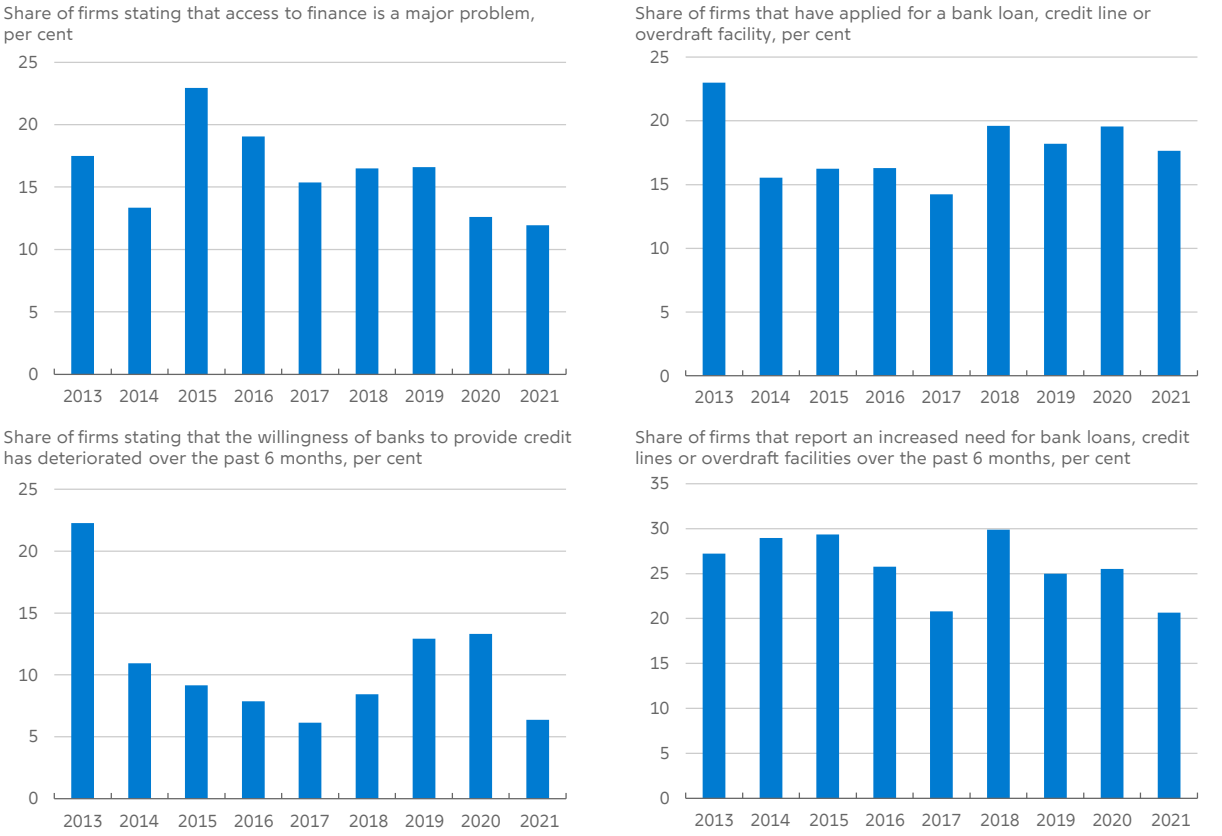
supplement the analysis of firm behaviour. We find that the previously indicated relation between leverage and credit growth is, in particular, driven by large firms, whereas for smaller firms we find that those with a low liquidity before covid-19 had a higher probability of taking on new debt, as well as a larger growth rate of debt.

In contrast to the results at the industry level (see Figure 3), we also find that firms whose value added declined the most (within industries) had a higher credit growth rate as well as a larger probability of taking on new debt. This probably reflects the need for liquidity to weathering the crisis. The firms whose value added increased the most also had a larger credit growth rate than the firms in the middle quartiles, potentially reflecting that these firms had a need for credit to finance increased investment or day to day operations in a situation with higher demand than before the pandemic. The results also demonstrate that firms that turned out having the highest increase in value added during 2020 increased their unused credit lines to a larger extent than other firms during 2020. Firstly, this may reflect the higher uncertainty brought about by the onset of the pandemic, also among firms that were not particularly exposed to the pandemic (measured *ex post*). Secondly, the lower exposure resulted in a smaller need to make use of the increased credit lines for emergency financing purposes, ceteris paribus. In addition, it is possible that these firms could more easily get approval of an additional credit line.

Overall, these results suggest that the banking system was able to assist with financing, both to firms that were directly exposed to the crisis and to firms that were not as exposed. This is also underlined by survey findings showing that access to finance was not perceived to be a major problem by a larger share of firms than before the pandemic, and demand for credit did not increase, cf. Figure 8. The results could, however, imply an increased risk in the banks' loan portfolios. Firms with the highest credit growth were hit harder by the pandemic and had weaker pre-pandemic balance sheets. The extent to which the risk has increased depends, among other things, on the effectiveness and targeting of the support measures introduced by the government. We will take a closer look at the effects of support measures on the credit development in the remainder of the paper.

Access to finance and credit demand in Denmark

Figure 8



Note: Reference period: April to September.
Source: Own calculations based on micro data from the Survey of Access to Finance of Enterprises (SAFE).

4. Liquidity measures and firm financing

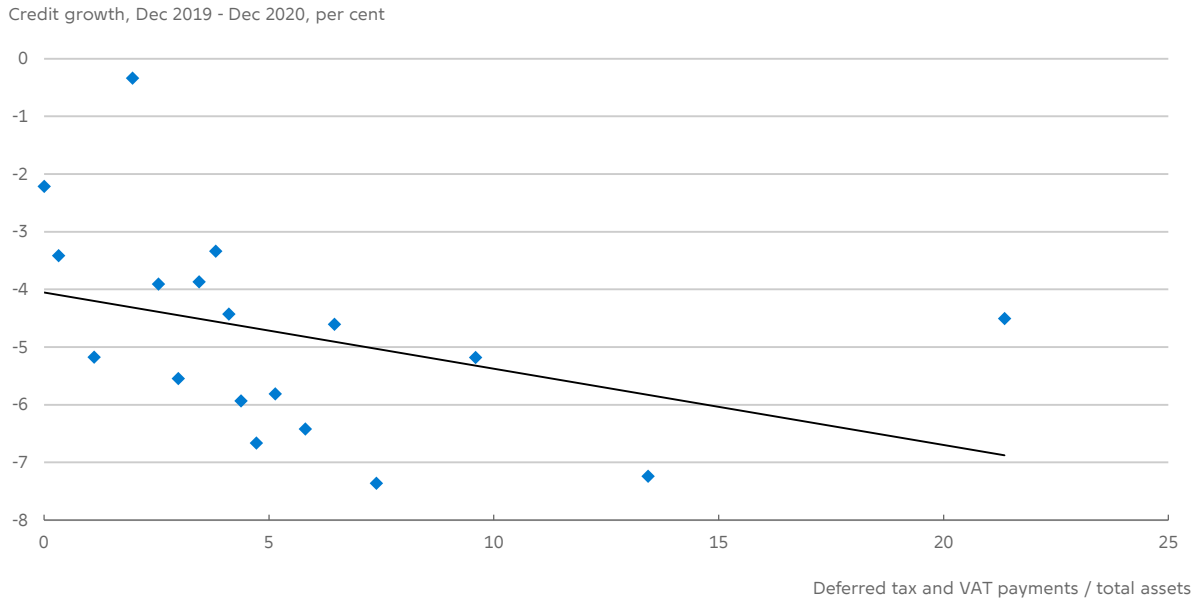
Following the onset of the pandemic, the Danish government introduced a number of measures to relieve firms' immediate financing needs as a consequence of the lockdowns and reduced demand. As noted in the overview in Table 1, the most comprehensive measure (at least in terms of *ex-post* usages) undertaken was to extend deadlines for payment of VAT, taxes and labour market contribution tax paid by firms on behalf of their employees by up to about seven months for all firms. The total liquidity made available through these deferrals amount to kr. 333 billion corresponding to 14.3 per cent of Danish GDP in 2019 (The Danish Tax Agency, 2021). Since the first deferrals in March 2020, the accumulated liquidity boost at any point in time has varied considerably, with a maximum of almost kr. 150 billion in June 2020.

Based on the firm-level data from the Danish Tax Agency, which comprise monthly, quarterly or semi-annual tax filings (depending on the size of the firm), we are able to estimate the amount of extra liquidity that each firm has got access to as a consequence of the extension of payment deadlines. While deadlines were extended

for all firms, variation in firm size, labour intensity and product prices across firms give rise to variations in the amount of tax and VAT for which deadlines were extended for each firm. We find a clear negative relation between this amount of extra liquidity and credit growth, cf. Figure 9. This suggests that the extension of deadlines for tax and VAT payments has been an important factor for firms' financing situation during the pandemic, and that the credit demand would have been substantially larger in the absence of such measures. Regression results taking variation in firms' background characteristics into account confirm that firms for which the extension of deadlines implied a larger liquidity effect had lower credit growth, cf. Table 4. These results also show that the probability of increasing debt and credit lines, as well as the growth rate in credit lines, was substantially lower for firms for which the liquidity effect of the policy measures was larger.

Deferred tax and credit growth

Figure 9



Note: Binned scatterplot. Each dot represents 5% of the observations. Deferred tax and VAT refer to the amount of tax (A-skat and AM-bidrag) and VAT for which payment deadlines were extended from 2020 to 2021. Control variables are quartiles for leverage, cash ratio and growth in value added from 2019 to 2020, as well as industry-fixed effects and the level of debt in the 4th quarter of 2019.
Source: Own calculations based on data from Danmarks Nationalbank, the Danish Tax Agency and Bisnode.

Table 4: Regression models: Liquidity measures and firm financing

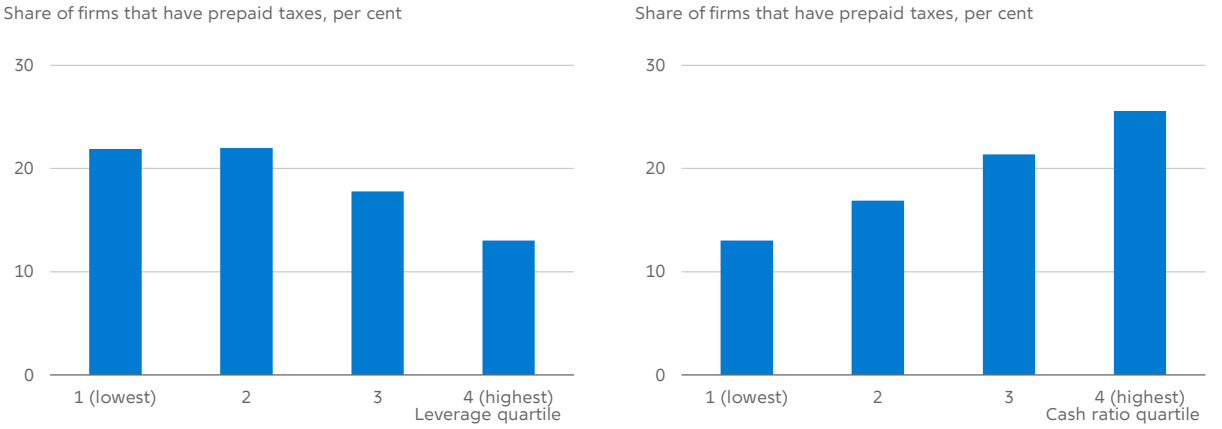
Dependent variable	Debt growth rate	Dummy debt uptake	Credit line growth rate	Dummy increase credit line	Dummy increase credit line but not debt
Deferred tax / value added					
2nd quartile	-2.365***	-0.0601***	-1.581***	-0.0369***	0.00235
3rd quartile	-3.856***	-0.0862***	-2.662***	-0.0697***	-0.0125***
4th quartile	-3.155***	-0.0621***	-2.013***	-0.0458***	-0.0133***
Controls	Yes	Yes	Yes	Yes	Yes
No. of observations	28,562	41,300	36,738	41,300	41,300
Deferred tax / total assets					
2nd quartile	-2.622***	-0.0568***	-1.449***	-0.0329***	0.0135***
3rd quartile	-4.996***	-0.0685***	-1.482***	-0.0309***	0.0252***
4th quartile	-4.559***	-0.0524***	-1.048**	-0.0167**	0.0276***
Controls	Yes	Yes	Yes	Yes	Yes
No. of observations	28,562	41,300	36,738	41,300	41,300

Note: Deferred tax refers to the amount of tax (A-skat and AM bidrag) and VAT for which payment deadlines were extended from 2020 to 2021. Control variables are quartiles for leverage, cash ratio and growth in value added from 2019 to 2020, as well as industry fixed effects and the level of debt in the 4th quarter of 2019. Data are based on Danmarks Nationalbank's credit register, merged with accounting data from Bisnode, and include all firms observed in the register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.

While the extension of deadlines applied to all firms, an option for early payments was introduced at the same time.[23] This option corresponded in effect to firms having the opportunity to pay VAT and tax at the original deadline or at any other point in time before the extended deadline. This could be an attractive option for firms having sufficient liquidity, in particular when the alternative is to place the liquidity in bank deposits carrying negative interest rates. Earlier evidence indicates that firms react quite strongly when faced with negative deposit rates (Abildgren and Kuchler, 2020). We do indeed find that pre-pandemic liquidity is a very strong predictor of prepaying VAT and taxes. The results in column 1 and 2 of Table 5, as well as in Figure 10 demonstrate that the probability that firms in the highest quartile of cash ratio prepay taxes is 10 percentage points higher than firms in the lowest quartile, corresponding to an increase in the probability of around 40 per cent. Results in Table 5 also show that firms with high leverage as well as firms that already had repayment problems (in the form of having at least one non-performing loan) were less likely to prepay taxes.

[23] It became possible to make early payments to the so-called tax account, where the deposit rate was zero.

Prepayment of taxes by leverage and liquidity quartiles Figure 10



Note: The sample includes all firms observed in the credit register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded. Leverage and cash ratio are based on the most recent accounting information, which is in all cases pre-pandemic. Prepayment of taxes refers to early payments into the firm's tax account.
Source: Own calculations based on data from Danmarks Nationalbank, Bisnode and the Danish Tax Agency.

Table 5: Determinants of prepaying taxes and applying for tax loans

		(1)	(2)	(3)	(4)
Dependent variable		Prepaid tax	Prepaid tax	Applied for tax loan	Applied for tax loan
Leverage	2nd quartile	0.00830	0.00815	0.0657***	0.0593***
	3rd quartile	-0.0163**	-0.0164**	0.123***	0.116***
	4th quartile	-0.0451***	-0.0453***	0.137***	0.128***
Cash ratio	2nd quartile	0.0342***	0.0340***	-0.0162***	-0.0262***
	3rd quartile	0.0677***	0.0676***	-0.110***	-0.117***
	4th quartile	0.101***	0.101***	-0.170***	-0.171***
Has an outstanding non-performing loan		-0.102***	-0.102***	0.0402***	0.0294***
Received wage or fixed cost compensation			0.00499		0.210***
Controls		Yes	Yes	Yes	Yes
No. of observations		32,571	32,571	32,392	32,392

Note: Linear probability models. "Prepaid tax" is an indicator for whether the firm has prepaid taxes or VAT (i.e. whether the firm has an amount larger than the pre-pandemic limit in their tax account in the 1st quarter of 2021). The baseline probability of having a positive amount in the tax account is 17.6% in the estimation sample. "Applied for tax loan" is an indicator for whether the firm has applied for one of the loan types provided by the government (VAT loan, tax loan or payroll tax loan) between the 1st quarter of 2020 and the 2nd quarter of 2021. The baseline probability of having applied for a tax loan is 24.6% in the estimation sample. Control variables are industry-fixed effects as well as the level of debt in the 4th quarter of 2019. A firm is classified as having a non-performing loan if the bank or mortgage credit institution assess that repayment of debt is unlikely without e.g. realising collateral or if the firm has at least one loan in arrears for more than 90 days. Data are based on Danmarks Nationalbank's credit register and data from Bisnode and the Danish Tax Agency, and include all firms observed in the credit register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.

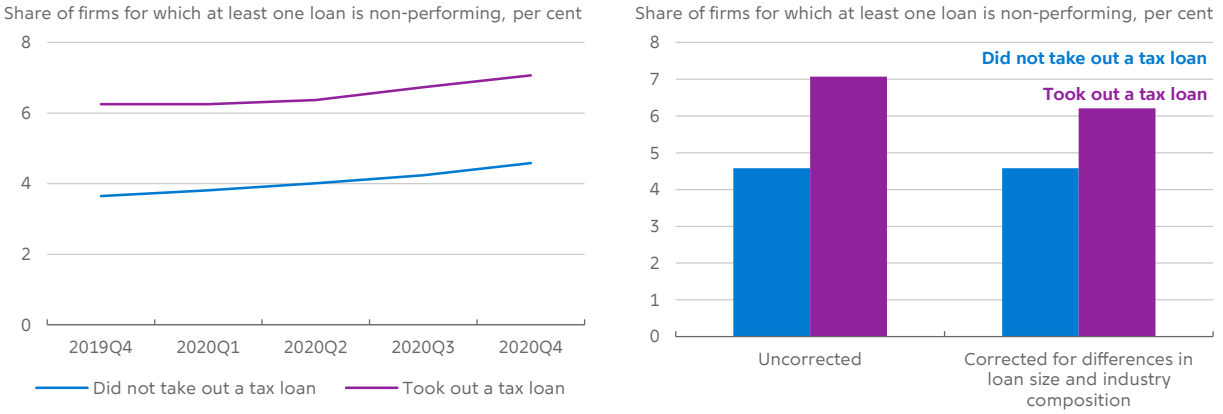
Small and medium-sized enterprises had the possibility to apply for a loan corresponding to their payment of VAT or payroll tax for one or two quarters in spring 2020. In addition, when the extended deadlines for VAT and income tax payments expired in 2021, a possibility to obtain loans corresponding to several months of income tax payments was introduced for all firms. A similar loan for VAT payments was made available for small and medium-sized enterprises (we will denote these different types of loans "tax loans"). Hence, from a firm's point of view, the difference between the extension of payment deadlines in 2020 and the possibility of obtaining loans in 2021 was that they had to actively apply for a loan in 2021 whereas the extension of deadlines was universally granted in 2020. Firms that took out a tax loan in the first part of 2021 decreased their bank debt to a larger extent than other firms in 2020 before taking out the tax loan, cf. Figure 11. To some extent, however, this pattern reflects industry and loan-size compositions; when we correct for these factors, we find no significant difference (at the 5% level) in credit growth during 2020 between firms that took out a tax loan in 2021 and firms that did not.[24] The results in Figure 12 also point to liquidity and leverage being correlated with the probability of applying for a tax loan.

[24] The analysis does not cover the interaction between the uptake of MFI loans in 2021 and tax loans in 2021.

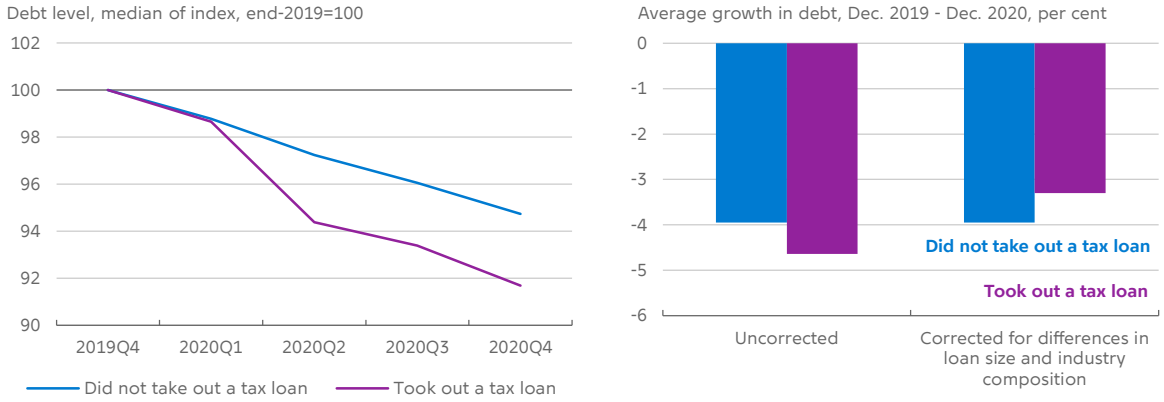
Non-performing loans, debt growth and tax loan applications

Figure 11

Non-performing loans



Debt growth

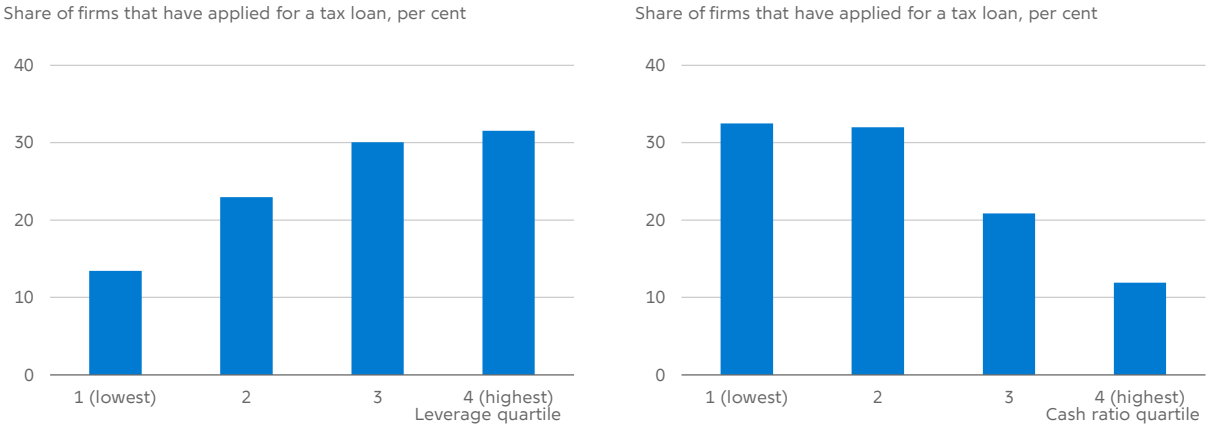


Note: Only firms observed in the credit register in all time periods have been included. In addition, firms with an outstanding amount of debt in the bottom quartile in 2019Q4 have been excluded. Right figures: The correction for differences in loan size and industry composition has been performed by probit regressions (top right figure) and OLS (bottom right figure). Non-performing loans in the top right figure are measured in 2020Q4. A firm is classified as having a non-performing loan if the bank or mortgage credit institution assess that repayment of debt is unlikely without e.g. realising collateral or if the firm has at least one loan in arrears for more than 90 days.

Source: Own calculations based on data from Danmarks Nationalbank, Bisnode and the Danish Tax Agency. Source: Own calculations based on data from Danmarks Nationalbank, Bisnode, and the Danish Tax Agency.

Tax loan applications by leverage and liquidity quartiles

Figure 12



Note: The sample includes all firms observed in the credit register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded. Leverage and cash ratios are based on the most recent accounting information, which is in all cases pre-pandemic. Tax loans cover both income tax loans (A-skattelån), VAT loans (momslån), and payroll-tax loans (lønsumsafgiftslån) originated in 2020 and 2021.
Source: Own calculations based on data from Danmarks Nationalbank, Bisnode and the Danish Tax Agency.

In columns 3 and 4 of Table 5 we model the determinants of applying for a tax loan more formally. As was the case for prepayment of taxes we see that liquidity is a very important predictor of applying for a tax loan. The probability of applying for a tax loan is 20 percentage points (81% of the baseline probability) lower for firms in the highest pre-pandemic liquidity quartile compared to firms in the lowest liquidity quartile (cash ratio). We also find a clear relation between application for tax loans and firms' leverage. Firms in the highest half in terms of leverage were 12 percentage points (50%) more likely to apply for a tax loan than firms in the lowest quartile. In addition, firms that had at least one non-performing loan were substantially more likely to take out a tax loan (see also Figure 11).

Furthermore, we find that firms that received some kind of compensation (wage or fixed cost compensation) were much more likely to apply for a tax loan. In this context, it is important to note that our estimates control for industry, so the effect is not driven by differences in exposure to the pandemic across industries. It is not surprising that liquidity-constrained firms made particular use of the government loan schemes, and this has probably contributed to preserving employer-employee matches during the pandemic. However, the fact that firms that were vulnerable even before the pandemic are largely overrepresented in the group of firms receiving continued government support makes it clear that the provision of these types of liquidity facilities comes with a significant uncompensated credit risk for the government. In addition, such measures inherently come with a risk of keeping alive low-productivity firms that would otherwise have closed. Dynamic allocation of resources across firms is normally an important driver of productivity growth in Denmark (Bess et al, 2020).

5. Compensation schemes and firm financing

Following up on the findings from the previous section, we continue by considering the interplay between compensation measures and firms' financing decisions. About 250,000 persons were sent home on wage compensation in the spring of 2020, and 40% of these compensated jobs were found in retail trade, hotels and restaurants which were industries most adversely affected by restrictions (Bess and Darougeh, 2021). In contrast to the liquidity measures, compensation measures were direct payments with no repayment conditions, so the government did not assume any credit risk in that respect. In addition, they were targeted, whereas liquidity measures were more generally available. Compensation measures have probably played a large role for preserving labour market links (Bess and Darougeh, 2021), and more generally for helping firms through the pandemic. Furthermore, the compensation measures might also have limited the decline in earnings among firms highly affected by the pandemic.[25] It is, however, beyond the scope of this paper to attempt to assess the overall impact of the compensation schemes on firms' financial situation. Such an exercise is left to future research, possibly exploiting cross country variation in compensation measures or data that could allow a longer-run assessment of firms' financial situation. Here, we will briefly extend the previous analysis to also cover compensation measures.

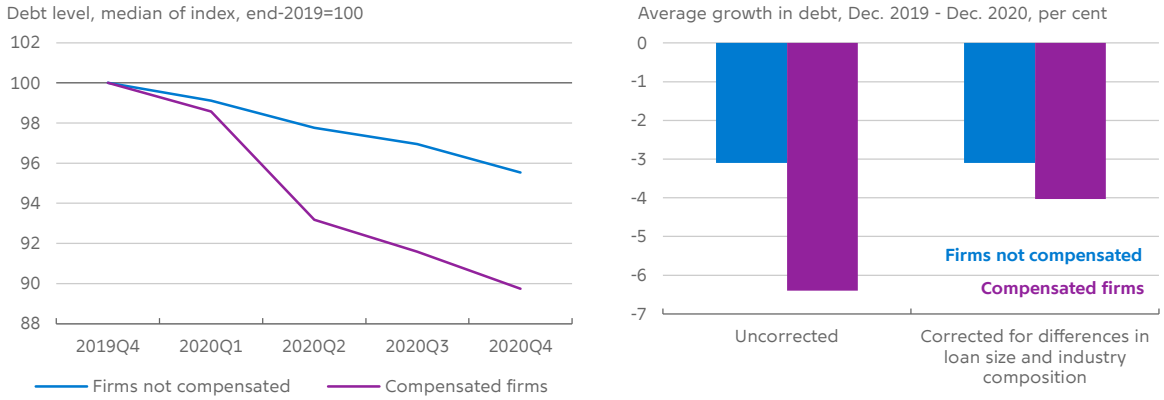
In the previous section, we found that firms that received wage or fixed cost compensation were more likely to apply for a tax loan. However, controlling for firms' background characteristics and the size of the shock (in the form of the growth rate in value added from 2019 to 2020), there is no significant difference between compensated and uncompensated firms in the credit growth rate or the probability of taking on new debt during 2020, cf. the regression results in Table 6.[26] Compensated firms were, however, more likely to establish new credit lines, again controlling for background characteristics. As was the case for the liquidity measures, we also find that firms that had non-performing loans even before the pandemic were more likely to receive wage or fixed cost compensation, cf. Figure 14. Most of the difference could, however, be explained by industry and loan-size compositions, reflecting the fact that industries with more vulnerable firms were hit harder by the pandemic. While these findings cannot be taken as conclusive evidence that compensation measures were successful in supporting the operations of the firms during the pandemic, they do indicate that the compensation measures have not been distorting firms' financing conditions materially.

[25] According to the annual accounts of the 1,000 largest Danish non-financial firms (compensated and uncompensated), the share of firms with a negative yearly growth in turnover increased from 31% in 2019 to 46% in 2020. In comparison, the share of firms with negative earnings only increased slightly from 15% to 18%.

[26] Descriptive results in Figure 13 indicate that compensated firms had lower credit growth than other firms in 2020, but this can be ascribed to underlying differences between the two groups of firms according to the regression results in Table 6

Credit growth and compensation measures

Figure 13



Note: The group of compensated firms consists of firms that have received either wage compensation or compensation for fixed costs. Only firms that are observed in the credit register in all time periods have been included. In addition, firms with an outstanding amount of debt in the bottom quartile in 2019Q4 have been excluded. Right figure: The correction for differences in loan size and industry composition has been performed by linear regression.

Source: Own calculations based on data from Danmarks Nationalbank, Bisnode and the Danish Business Authority.

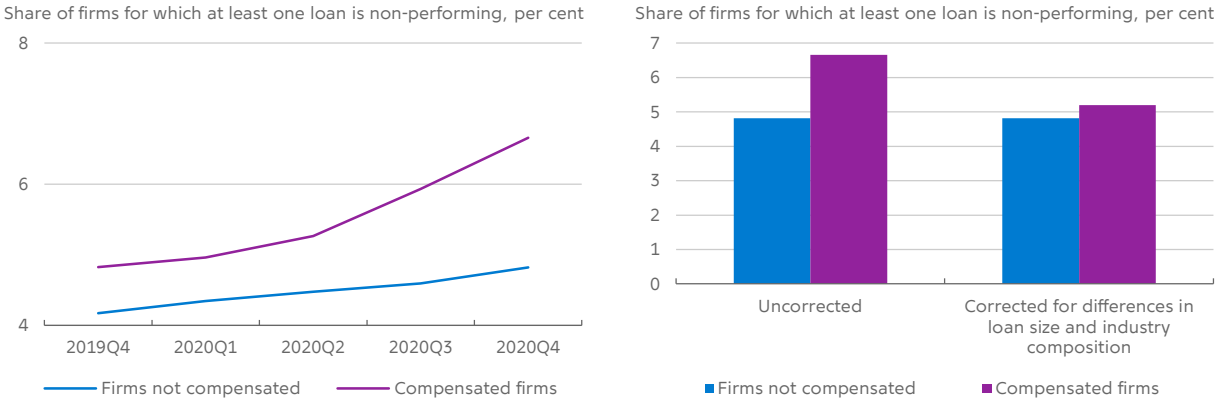
Table 6: Regression models: Debt, credit lines and compensation schemes

Dependent variable	(1) Debt growth rate	(2) Dummy debt uptake	(3) Credit line growth rate	(4) Dummy increase credit line	(5) Dummy increase credit line but not debt
Received wage or fixed cost compensation	-0.372	0.00266	1.155***	0.0337***	0.0277***
Controls	Yes	Yes	Yes	Yes	Yes
No. of observations	29,161	42,116	37,409	42,116	42,116

Note: Control variables correspond to the regressions reported in Table 3 (quartiles of leverage, cash ratio and growth in value added, industry fixed effects as well as the level of debt in the 4th quarter of 2019). Data are based on Danmarks Nationalbank's credit register and include all firms observed in the register in all quarters between December 2019 and December 2020. Firms in the lowest quartile of debt have been excluded.

Non-performing loans and compensation schemes

Figure 14



Note: The group of compensated firms consists of firms that have received either wage compensation or compensation for fixed costs. Only firms observed in the credit register in all time periods have been included. In addition, firms with an outstanding amount of debt in the bottom quartile in 2019Q4 have been excluded. A firm is classified as having a non-performing loan if the bank or mortgage credit institution assess that repayment of debt is unlikely without e.g. realising collateral or if the firm has at least one loan in arrears for more than 90 days. Right figure: Based on data for 2020Q4. The correction for differences in loan size and industry composition has been performed by probit regressions.

Source: Own calculations based on data from Danmarks Nationalbank, Bisnode and the Danish Business Authority.

6. Concluding remarks

In this paper, we have analysed firms' financing decisions during the covid-19 pandemic with a particular focus on how firms responded to government support measures. We find that credit growth was modest during the pandemic, and many firms reduced their debt level during 2020. This could to a large extent be ascribed to fiscal support measures such as compensation and liquidity schemes. Firms that were more exposed to the pandemic had higher debt growth than other firms, in particular those with weaker pre-pandemic balance sheets.

Public liquidity measures such as deferred tax and VAT payments served as a substitute for more traditional funding sources during the pandemic. There are indications, however, that firms which were weak even before the pandemic have received a disproportionately high share of some of the latest liquidity measures offered, i.e. the income tax and VAT loans. We find no differences in credit developments between recipients and non-recipients of wage and fixed cost compensation.

The deferral of taxes became available for all firms that were about to pay taxes. In that sense, this measure was broadly scoped and hence not targeted at firms adversely affected by the pandemic, unlike the compensation schemes. On the one hand, this facilitated a swift implementation of the tax deferrals, which to

a very large extent alleviated the liquidity issues in vulnerable firms. In addition to this direct liquidity effect, the deferrals may have contributed to maintaining lending capacity in some banks at the peak of the crisis, since the deferrals worked as a substitute for borrowing from banks for many firms. Thus, as a result of fewer firms demanding bank credit it may have been easier for firms exposed to the pandemic to obtain a bank loan at the peak of the crisis compared to a situation with no tax deferrals.

On the other hand, however, the tax deferrals also provided interest-free liquidity for firms that were not affected adversely by the pandemic but already suffered from financial problems prior to the pandemic. Consequently, the government on behalf of the taxpayers ran a calculated, uncompensated credit risk since its exposures to losses increased somewhat. In addition, keeping unfit firms alive could risk giving rise to more zombie firms and hence to economic inefficiencies due to a less dynamic allocation of resources across firms. Arguably, the risk of more zombies may be considered a second-order concern in such an exceptional crisis, where the lockdowns and the support measures were temporary and hence only hampered business dynamics temporarily. Finally, the broadly scoped tax deferrals probably also implied an abundance of liquidity in firms that were not in need of a cash injection. Note, however, that some of these firms decided to prepay bank debt extraordinarily as well as deposit liquidity in their interest-free tax account with the government. The provision of tax loans, which in 2021 to a large extent replaced further tax deferrals, did solve the issue of allocating liquidity to firms without a cash demand, since firms had to apply for the liquidity. Compared to the compensation schemes, however, the tax loans were still not targeting the firms only being adversely affected by the pandemic.

Our results can be useful for the design of potential future support measures. However, we are only able to assess the short-term responses and short-term effects of policies, and we have focused on the implications for credit developments. An assessment of medium-term outcomes of the type considered here as well as for outcomes such as firm exit, zombie lending and labour market effects, could be fruitful avenues for future research and could serve as the basis for a more complete evaluation of the fiscal support measures introduced during the pandemic. In addition, it could also be of relevance to consider the impact of the measures on firms' broader financing decisions, i.a. the evolution of equity financing compared to debt financing as well as debt financing stemming from other sources than Danish banks and mortgage banks. The data for such an exercise are currently not available. However, as mentioned small- and medium-sized firms rely significantly more on financing from banks and mortgage banks than market-based finance, which makes analysing this type of debt a valuable point of departure for understanding financing decisions of these firms during the pandemic.

References

Abildgren, Kim and Andreas Kuchler (2020), Do firms behave differently when nominal interest rates are below zero?, *Danmarks Nationalbank Working Paper*, no. 164.

Abildgren, Kim, Mark Niels Strøger Hansen, Carina Moselund Jensen, Mark Strøm Kristoffersen and Oxana Skakoun (2014), Corporate capital structure and profitability, productivity and access to finance, *Danmarks Nationalbank Working Paper*, no. 91.

Andersen, Svend, Paul Lassenius Kramp and Andreas Kuchler (2019), Low prevalence of zombie firms in Denmark, *Danmarks Nationalbank Analysis*, no. 29/2019.

Bennedsen, Morten, Birthe Larsen, Ian Schmutte and Daniela Scur (2020), Preserving job matches during the COVID-19 pandemic: Firm-level evidence on the role of government aid, *Covid Economics*, Issue 27.

Bess, Mikkel and Saman Darougeh (2021), Three lessons from the Danish wage compensation scheme, *Danmarks Nationalbank Economic Memo*, no. 5/2021.

Bess, Mikkel, Andreas Kuchler and Morten Werner (2020), The covid-19 crisis reduces Danish growth potential, *Danmarks Nationalbank Economic Memo*, no. 9/2020.

Brülhart, Marius, Rafael Lalive, Tobias Lehmann and Michael Siegenthaler (2020), COVID-19 financial support to small businesses in Switzerland: evaluation and outlook, *Swiss Journal of Economics and Statistics*, Vol. 156, article no. 15.

Buchheim, Lukas, Jonas Dovern, Carla Krolage and Sebastian Link (2020), Firm-Level Expectations and Behavior in Response to the COVID-19 Crisis, *CESifo Working Paper*, no. 8304.

Danmarks Nationalbank (2020a), Credit institutions are facing hard times, *Danmarks Nationalbank Analysis* (Financial Stability – 1st half 2020), no. 8/2020.

Danmarks Nationalbank (2020b), Stable financial markets support economy in recession, *Danmarks Nationalbank Analysis* (Monetary and Financial Trends – September 2020), no. 17/2020.

Danmarks Nationalbank (2020c), Banks should keep their powder dry, *Danmarks Nationalbank Analysis* (Financial Stability – 2nd half 2020), no. 28/2020.

Danmarks Nationalbank (2020d), Danish and international economy hit by pandemic, *Danmarks Nationalbank Analysis*, no. 4/2020.

Danmarks Nationalbank (2021a), Accommodative financial conditions strengthen the upswing, *Danmarks Nationalbank Analysis* (Monetary and Financial Trends – September 2021), no. 23/2021.

Danmarks Nationalbank (2021b), Banks ready for expiry of government liquidity support, *Danmarks Nationalbank Analysis*, no. 10/2021.

Danmarks Nationalbank (2021c), Build-up of risks in credit institutions, *Danmarks Nationalbank Analysis* (Financial Stability – 1st half 2021), no. 12/2021.

Jensen, Carina Moselund, Rasmus Mose Jensen, Nastasija Loncar and Alexander Meldgaard Otte (2020), Lower borrowing needs in Danish corporations compared to European during covid-19, *Danmarks Nationalbank Analysis*, no. 20/2020.

OECD (2020), *COVID-19 Government Financing Support Programmes for Businesses*, OECD Paris.

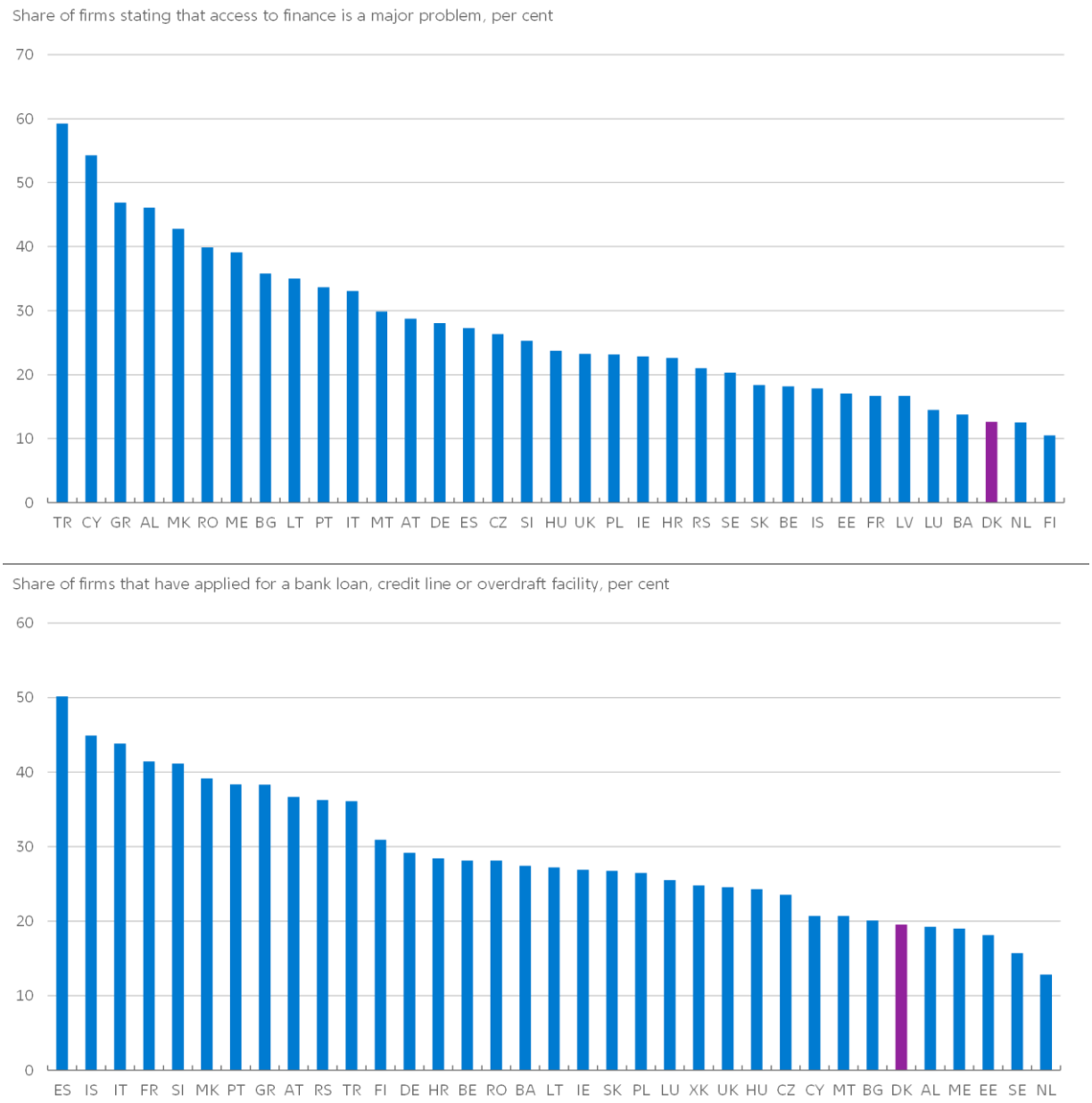
Pellegrino, Giovanni, Federico Ravenna and Gabriel Züllig (2021), The Impact of Pessimistic Expectations on the Effects of COVID-19-Induced Uncertainty in the Euro Area, *Oxford Bulletin of Economics and Statistics*, Vol 83, pp. 841-869.

The Danish Tax Agency (2021), *Skatteøkonomisk redegørelse 2021*.

Appendix A: Supplementary figures

Access to finance and applications for bank loans across countries, 2020

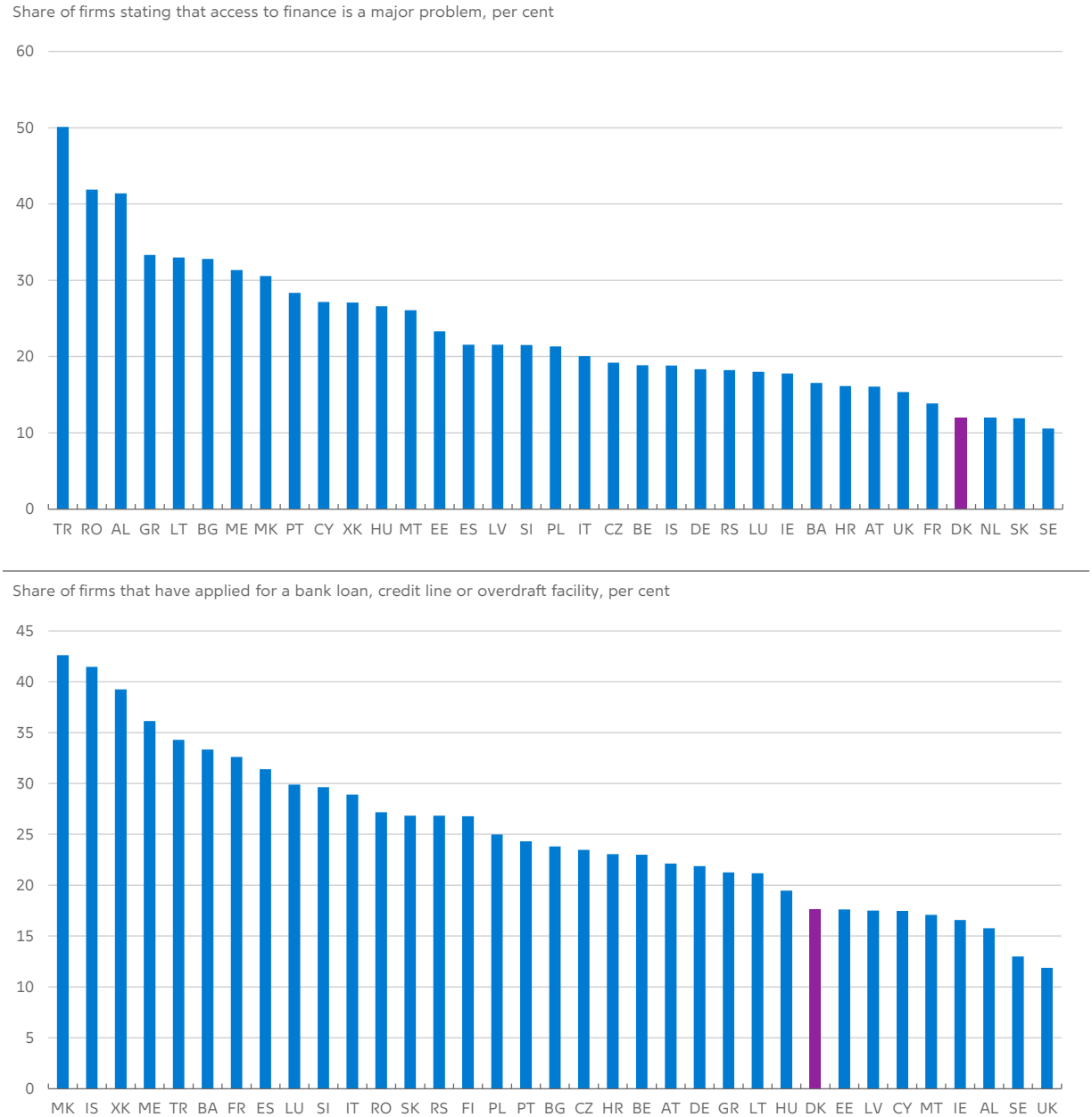
Figure A.1



Note: Reference period: April to September 2020. First figure: Share of firms answering 8, 9 or 10 on a scale from 0 to 10 when asked to assess the extent to which access to finance is a problem.
Source: Own calculations based on micro data from the Survey of Access to Finance of Enterprises (SAFE).

Access to finance and applications for bank loans across countries, 2021

Figure A.2



Note: Reference period: April to September 2021. First figure: Share of firms answering 8, 9 or 10 on a scale from 0 to 10 when asked to assess the extent to which access to finance is a problem.

Source: Own calculations based on micro data from the Survey of Access to Finance of Enterprises (SAFE).

PUBLICATIONS

NEWS

News offers a quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.

ANALYSIS

Analysis from Danmarks Nationalbank focuses on economic and financial matter. Some of the analyses are published with a regular frequency e.g. *Outlook for the Danish economy and Financial stability*. Other analyses are published continuously.

REPORT

Report comprises recurring reports and reviews of the functioning of Danmarks Nationalbank. For instance Report includes the *Annual report* and the annual publication *Danish government borrowing and debt.*

ECONOMIC MEMO

Economic Memo is a cross between Analysis and Working Paper and it often shows the ongoing study of the authors. The publication series is primarily targeted at professionals. Economic Memo is published continuously.

WORKING PAPER

Working Paper presents research projects by economists in Danmarks Nationalbank and their associates. The series is primarily targeted at professionals and people with an interest for academia. Working Paper is published continuously.

DANMARKS NATIONALBANK
LANGELINIE ALLÉ 47
DK-2100 COPENHAGEN Ø
WWW.NATIONALBANKEN.DK

DANMARKS NATIONALBANK