The consequences of COVID-19 crisis on firms' liquidity needs *

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Abstract

The economic recession triggered by the Covid-19 pandemic has generated a negative impact on firms' liquidity needs, induced both by the rigidity of costs and financial commitments and by the drop in sales linked to the restrictions on economic activities imposed during the periods of pandemic propagation. This paper analyzes these effects on the liquidity needs of Italian firms, before and after the government support interventions, focusing on non-financial firms with revenues up to €50 million and with fewer than 250 employees. By constructing a new dataset that integrates information from multiple sources, we show that government measures have strongly contributed to mitigate the effects of the crisis, almost halving the percentage of companies in liquidity crisis at the end of 2020 (from 38.1% to 18.2%) and limiting the liquidity requirements of companies from 83.7 to 26.5 billion. The access to public guarantee schemes on loans would further reduced the deficit to 18.5 billion euros. Debts standstill, fixed cost refunds and the non-repayable grants have been very effective in supporting firms, that have actually recorded a liquidity deficit due to pandemic crisis.

JEL codes: H32, G01, G33
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1 Introduction

The economic recession triggered by the Covid-19 pandemic has generated a negative impact on firms' liquidity needs, induced both by the rigidity of costs and financial commitments and by the drop in sales linked to the restrictions on economic activities imposed during the periods of pandemic propagation. Banerjee et al. (2020), using corporate financial statements of 2019, estimate that following a 10% drop in revenues, operating expenses only fall by 6% on average. Therefore, one of the first challenges that most governments had to face was to avoid that illiquid but solvent firms go bankrupt. Thereby a key task for governments was to estimate the amount of liquidity needed to avoid crises and the potential number of companies affected, in order to design a set of policy measures able to minimize the liquidy shortage of firms. These estimates turned out to be crucial for formulating policies aimed at helping businesses in a timely manner (OECD (2020)). Despite of the heterogeneous impact of the policies implemented to address the liquidity gaps on firms and sectors, Ebeke et al. (2021) estimate that announced policy measures in advanced economies of the European Union could have potentially reduced Covid-19-induced liquidity shortfalls by four-fifths on average. Among the policy measures, the study suggests that guaranteed loans, job-retention programs, and debt moratoria contribute the most to lowering the liquidity gap. After tackling the initial emergency, in the post-lockdown economy, governments will have to find the right policy-mix to sustain the recovery especially for those markets in which the duration of the shock is still highly uncertain. Blanchard et al. (2020) suggest that public efforts should be focused on including a gradual phasing out of job-retention schemes and the phasing in of sectoral wage subsidies to create incentives to resume production. At the same time, credit guarantees for new loans should continue and a process-light loan restructuring programme should be put in place to better address the likely increase in the number of insolvencies.

This analysis was initially undertaken in April 2020 in order to provide a quantitative contribution to the policy maker useful for defining the interventions to support businesses that would be included in the Covid-19 decrees (starting with the "Rilancio" Decree). The results were extended through the use of ex-post data presented in this paper. We extend the accounting framework proposed by Schivardi (2020) that aims at determining which firms will have liquidity constraints and to what extent. We do so, firstly, by constructing a micro-founded database that includes information from multiple sources and allows measuring the variability of the effects on each individual firm of the sample. Thanks to the granularity of the available data, we are able to estimate changes in revenues and costs for each individual firm for every month of

2020. Specifically, information regarding the cost and revenue structure of each firm is derived from the most recent available financial statements[1].

To estimate the changes of such macro aggregates in 2020, we have implemented a forecasting method based on data from VAT returns. Companies are periodically required to submit a statement showing all positive transactions subject to VAT (e.g. sale of goods and services) and all negative transactions for which they were subject to VAT (e.g. costs for purchase of raw materials, etc.) relating to the reference period. We calculate the growth rate of positive components subject to VAT in 2020 compared to those in 2019 and apply this rate to 2019 revenues to estimate the value of sales in 2020. A similar procedure was applied to costs, in particular the growth rate of negative components was utilised to approximate the change in raw material costs. Lease and rental costs were instead assumed constant over the period. The estimate of labor costs for 2020 was obtained using the data provided by INPS on funds allocated for social safety net[2]. In particular, we calculated the rate of change between the wages paid by each firm in each month of 2020 starting from March 2020 and the average wages paid by the same firm between January and February 2020. Thanks to this approach, we are able to estimate the variations experienced by each individual firm, thus including in the analysis also a degree of "within sector" heterogeneity, thus ensuring a high degree of accuracy in the simulation of revenue and cost trends.

In addition to previous contributions, we have also included in the analysis the effects of the supporting measures provided by the government from March 2020 to December 2020: the "Cura Italia", "Liquidità", "Rilancio", "Agosto", "Ristori", "Ristori Bis", "Ristori Ter" and "Ristori Quater" decrees. This allowed us to highlight the extent to which government support contributed to mitigating the liquidity crisis, while also taking into account sectoral and regional differences in the intensity of support resulting from the regulatory differences introduced by these decrees.

In our contribution we analyse the effects of the Covid-19 shock on the liquidity needs of Italian non-financial firms with revenues up to €50 million and with less than 250 employees, which account for over 20% of the country's total value added and includes firms which were most affected by the restrictions on economic activities imposed to deal with the pandemic. The sample includes corporations (797,224) [3] and

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[1]2019 financial statements for corporation and RS section of the 2018 Income Model for partnerships in ordinary accounting.

[2]The INPS data available, and therefore used in the analysis, refer only to corporations.

[3]From the initial sample of companies included, have been excluded, for the purposes of analysis: (i) companies in conditions of non-normal activity; (ii) companies that carry out financial activities (ATECO 64-66); (ii) companies with revenues above €50 million.

partnerships in ordinary accounting (228,920). The analysis shows how government support have strongly contributed to mitigate the effects of the crisis, in particular, we find that these measures has almost halved the percentage of companies in liquidity crisis at the end of 2020 (from 38.1% to 18.2%) and has limited the liquidity requirements of companies from 83.7 to 26.5 billion. In addition, by including in the analysis the public guarantee schemes on loans provided for by the "Liquidità" Decree, the deficit would be reduced to 18.5 billion of euro and the share of companies in liquidity crises to 13.5%. With respect to support measures, we found that debt standstill, support to business expenditures and non-repayable grants, have been very effective in supporting businesses, especially those that have actually recorded a liquidity deficit.

The results derived from our analysis are consistent with those proposed by other institutions like Bank of Italy (2020) and European Commission (2020), whose work is based on a methodology relying on the early contribution of Schivardi (2020).

Section 2 provides a brief description of the methodology implemented to estimate liquidity deficit for each firm. In Section 3 we describe the support measures adopted by the Government in the period of interest, while Section 4 shows the main results of the analysis. Section 5 concludes.

2 Methodological approach

The variation in liquidity of firms subject to the analysis was simulated starting from the financial needs observed in the most recent balance sheets data. This simulation takes advantage of the most up-to-date information available on the actual performance of the real economy, reflecting not only changes in the cost and revenue structure of individual economic operators but also incorporating all the public interventions in support of businesses adopted during 2020, to deal with the pandemic crisis. The operating cash flow was calculated by reducing the costs sustained for the purchase of goods and services, for the lease of assets and for wages and salaries, and by excluding loan repayments and related interests, taking into account the debt standstill introduced with the "Cura Italia" decree and extended by the "Agosto" decree. We have assumed that expenditure to finance new investments (or the simple replacement of obsolete machinery) has been reduced to zero during the period considered, which implies that we will analyze the change in operating cash flow. The analysis, therefore, provides a conservative estimate of the overall liquidity needs of companies. The baseline equation, in the case of a debt standstill and interest freeze

is the following:

$$L_{i,t} = L_{i,t-1} + V_{i,t} - C_{i,t} \tag{1}$$

where $L_{i,t}$ and $L_{i,t-1}$ represent, respectively, the liquidity at time t and time $t-1$ of the i-th company, $V_{i,t}$ represents the revenues of the ordinary operations and $C_{i,t}$ represents the costs, in the reference period, t.

Thanks to this dynamic equation, it is possible to calculate both the number of companies that could have become illiquid by the end of 2020 and the size of the liquidity deficit for each company and for the economy as a whole. In particular, an illiquid firm is defined as a firm whose liquidity at time t, simulated through the above equation, is strictly negative, while a liquidity deficit is the amount required by each firm to restore the value of its liquidity to a non-negative level.

By adding more detail, equation (1) can be rewritten as:

$$L_{i,t} = L_{i,t-1} + V_{i,t-12}*(1+\gamma_{i,t/t-12}) - (M_{i,t-12} + \Delta M_{i,t/t-12}) - G_{i,t} - W_{i,t-12}*(1+\lambda_{i,t/\bar{t}}) \tag{2}$$

Where t refers to each month starting from January 2020, i represents each company included in the analysis, and, as mentioned before, $L_{i,t}$ and $L_{i,t-1}$ are respectively, the liquidity in the month t and $t-1$ of the i-th company.

$V_{i,t}$ and $M_{i,t}$ represent, respectively, the monthly value of sales and costs of raw material sustained by the i-th company in the month t. Considering that the balance sheet only provides annual aggregates and that our analysis is conducted on a monthly basis, at a preliminary stage we proceeded by disaggregating the macro items of revenues and costs on a monthly basis. To do this, the value of the items $V_{i,t-12}$ and $M_{i,t-12}$ is calculated by multiplying the annual value of the items observed for the i-th company in the 2019 balance sheet by a weighting factor defined ad hoc for each month of the year. The size of this weighting factor, identified at the 6-digit ATECO level, is defined by calculating the relative weight of each month on the annual taxable amount observed from the 2019 e-invoicing data. This makes it possible to reconstruct a picture of the trend in cash flows in line with the businesses' operations, reproducing any seasonal trends or particular concentration of flows at certain times of the year. After carrying out this operation we obtain $V_{i,t-12}$ and $M_{i,t-12}$ which represent respectively the value of revenues and costs for raw materials for firm i in each month of 2019. In order to obtain the value of the sales in 2020 we exploit the knowledge of

the VAT declarations for the year 2020, through the latter it is possible to calculate for each month of 2020 the growth rate of the positive component $(\gamma_{i,t/t-12})$ compared to the same month of 2019. Assuming that for each firm i the revenues change at the same rate as the positive components, we calculate $V_{i,t}$ for each month of 2020 by applying the coefficient γ to the balance sheet value of the same month of 2019. Instead, raw material costs in 2020 were calculated as the sum of the balance sheet value in 2019 and the change in the share of negative components related to raw material cost between each month of 2020 and the corresponding month of 2019 $(\Delta M_{i,t/t-12})$ [4]. The different treatment of cost items with respect to revenues is due to the fact that the negative components of LIPE contain within them both costs for raw materials and services and costs for rents (assumed constant in the analysis) and that it is not possible to disaggregate the two items. Applying the aggregate rate of change to the 2019 budget value would have resulted in an underestimation of the changes, given the invariance of the costs of third-party assets. For this reason, we decided to calculate the 2020 value by increasing the 2019 budget values with the absolute change in the negative components of LIPE.

$G_{i,t}$ refer to the monthly costs for the use of third party assets sustained by the i-th company in the month t. We consider the costs for the use of third party assets constant from one year to the next and are therefore calculated by equally re-proportioning the balance sheet data over each month.

$W_{i,t}$ refer to the monthly costs for employees sustained by the i-th company in the month t. The cost of employees is calculated starting from the value registered in the balance sheet and split for each month of 2019. In order to calculate the cost of employees in 2020, we exploited the availability of INPS data on wages paid by companies. In particular, we calculated the rate of change between the wages paid by each firm in each month of 2020 starting from March 2020 and the average wages paid by the firm between January and February 2020 $(\lambda_{i,t/\bar{t}})$ and we apply this to the wages reported in the balance sheet for 2019. It was not possible to directly include the value of INPS wages in the cash flow calculation because these do not include the entire amount of the payroll but only a part (net of the company's social security contributions), since for the cash flow calculation it was necessary to include all the

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[4]In the absence of periodic VAT returns, the variation in revenue is applied to the increase or decrease resulting from the comparison between 2019 and 2020 of the electronic invoicing data, available by 6-digit ATECO sector. For the purpose of the simulation of the costs for the purchase of raw materials and services, the elasticity to the change in revenue is calculated by identifying a representative value for the sector: in particular, the median value that can be found from the distribution of the entities - with sign matching between the change in revenue and costs - for which the data was available in the periodic returns.

company's expenses.

3 Measures introduced by the Government to support businesses

In order to quantify the actual liquidity need at the end of 2020, the analysis includes all the measures implemented by the Government from March to December 2020. The "Cura Italia" decree (D.L. 18/2020) introduced the debt stand still, extended the social safety net and suspended some fiscal payments. The "Liquidità" decree (D.L. 23/2020) introduced loan guarantees to support businesses and further extended fiscal payments deadlines. The "Rilancio" decree (D.L. 34/2020) introduced the non-repayable grants and other measures to support business expenditures. The "Agosto" decree (D.L. 104/2020) and the "Ristori" decree (D.L. 104/2020) strengthened the measures previously adopted. Whereas, the "Ristori Bis", "Ristori Ter" and "Ristori Quater" decrees (D.L. 149/2020, D.L. 154/2020, D.L. 157/2020) are based on the DPCM introduced in November (Figure 1) which identifies different areas of risk (yellow, orange and red zones) within the national territory and determines different levels of restrictions on businesses. These restrictions had a different impact on regions, as reported in Figure 1. The map is built from an index based on the number of days each region spent in the yellow, orange or red zone (regions classified as red for many days are coloured dark red, while regions classified as yellow for the whole period are coloured light pink). A brief analysis of the Government support interventions is useful to understand the impact they had on the liquidity need.

Figure 1: Restrictive measures adopted following the DPCM of 3 November

Note: This figure was constructed from a measure based on the number of days each region was in a given range (from dark red for regions in the red zone for a greater number of days to light pink for regions that remained in yellow zone for the entire period).

3.1 Debt stand still

The "Cura Italia" decree established that micro, small and medium-sized enterprises facing a liquidity shortage can benefit from a debt stand still, available until 30 September 2020 and extended to 31 January 2021 by the "Agosto" decree. The debt stand still refers to long-term loans - not impaired - such as mortgages, instalment loans, non-accrual loans and credit lines. In order to simulate the operating cash flow, debt repayments and related interests are excluded from the simulation.

3.2 Social safety net

In order to simulate the financial outlays related to labour costs, it is necessary to take into account the social safety net as extended by the "Cura Italia" decree and available from 23 February to 31 August 2020. To do this, we use INPS data on wages actually paid. In detail, we compare the wages paid during the lockdown with the wages paid in the previous months. From this comparison, we determine for each enterprise a coefficient λ, which represents, if negative, the percentage of the remuneration paid

directly by INPS [5]. To compute the monthly operating cash flow, the simulated wages are equal to the wages declared in the balance sheets split for each month in a year times ($1 + \lambda$). The "Agosto" decree extended the social safety net for further nine weeks from 13 July to 31 December 2020.

3.3 Non-repayable grants

The "Rilancio" decree introduced a non-repayable grant proportional to the reduction in turnover due to the emergency for VAT holders who carry out business and self-employment activities. This contribution was introduced for enterprises with a turnover not exceeding 5 million euros and belonging to one of the subsequent categories: companies with a turnover in the month of April 2020 less than two-thirds of the turnover in April 2019; companies with a fiscal domicile in a municipality affected by calamitous events. The amount of the contribution is calculated by applying a percentage to the difference between the turnover registered in April 2020 and the turnover registered in the same month of the previous year. There are different percentages according to the revenue declared in the balance sheet 2019[6] , and it is also considered a minimum contribution. Whereas, the "Agosto" decree provides for a non-repayable contribution to restaurants and catering activities[7] whose average turnover for the months from March to June 2020 is less than three quarters of the previous year. In detail, a contribution is granted to enterprises that satisfy the requirements described above and it is calculated by dividing the 600 million euros fund allocated by the Government proportionally to the expenses faced by each possible beneficiary. This contribution is attributed in November and there are a minimum amount of 1.000 euros and a maximum of 10.000 euros. The "Ristori" decree extends the scope of the benefit to the month of December for enterprises with revenues higher than 5 million euros. Similarly, the contribution amount incorporates the "Ristori Bis", "Ter" and "Quater" decrees, which further enlarged the population of beneficiaries and, at the same time, intensified the scope of the measure.

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[5]It is assumed that the composition of labour costs is the same in the compared periods. This is not true, for example, in the case of seasonal work or restructuring phases. If INPS data are not available, the coefficient λ corresponds to the median value observed in the sector to which the firm belongs.

[6](i) 20%, in the case of revenues and fees less than or equal to €400,000; (ii) 15%, in the case of revenues and fees exceeding 400.000, but not exceeding 1.000.000 euros; (iii) 10%, in the case of revenues and fees exceeding €1.000.000 but not exceeding 5.000.000 euros.

[7]ATECO Codes 56.10.11, 56.29.10 and 56.29.20.

3.4 Suspended and exempted fiscal payments

These measures introduced by the Government refer to the value added tax, the regional tax on productive activities and the corporate income tax.

3.4.1 Value Added Tax

The "Cura Italia" decree provided for the suspension of VAT payments due in March until 31 May, in favour of those enterprises that meet the requirements. This deadline was extended until 16 September by the "Liquidità" decree and the "Rilancio" decree, which also introduced the possibility to pay in one lump or some instalments. The "Agosto" decree introduced further support to businesses by halving the amount of the payment to be made by 16 September. It established that the remaining 50% of the total amount can be paid in some instalments up to a maximum of 24 with the first instalment due by 16 January 2021. The "Ristori Bis", "Ter" and "Quater" decrees postponed the VAT payments due in November and December, and extended the scope of the support not only to eligible enterprises, but also to those particularly affected sectors[8] and to those businesses operating in territorial areas at risk according to the DPCM introduced in November. It should be remarked that the operating cash flow calculation does not take into account the time mismatch between the collection and the payment of VAT on sales and purchases, and neither considers the payment to the Treasury. However, if the enterprise can benefit of the suspended VAT, the considerable time extension requires the inclusion of the VAT debt in the monthly cash flow calculation. This corresponds to additional liquidity for the enterprise in a given month. Therefore, using the data provided by the periodic VAT returns for 2020, the difference between VAT due and VAT deducted[9] , if positive, represents a financial resource for the enterprise. With regard to the VAT credit, deriving from the previous month, it is assumed to be directly absorbed in the month in which it was generated, while the credit from the previous period is added to the cash flow in the corresponding months.

3.4.2 Regional tax on productive activities

The "Rilancio" decree provided for the exemption of the 2019 balance payment and the first instalment of the 2020 advance payment, in favour of businesses with turnover of less than 250 million euros in the previous tax period. The "Agosto" and "Ristori Quater" decrees postponed the deadline for the payment of the second instalment of

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[8]ATECO Codes 56, 55.10.00, 79.1, 79.11, 79.12, 47.72.10.

[9]In case of incomplete information, it is used the average sectoral rate applicable to sales and purchases.

the IRAP in favour of businesses with a turnover of less than 50 million euros and enterprises that suffered a decrease in turnover of at least 33% in the first half of 2020 compared to the previous year. The 2019 IRAP balance and the 2020 IRAP advance payments are treated separately. In the first case, for each enterprise, the residual amount of the tax period 2019 is assimilated to the amount recorded in the tax period 2018, assigning an increase in the cash flow to the subjects with a credit for the IRAP already paid. In order to determine the taxable base, for the calculation of the 2020 IRAP advance payments, the historical method (taking the net production value resulting from the last IRAP declaration for the 2018 tax year) and the forecasting method are compared, opting for one or the other depending on which was less onerous for the enterprise. In this way, it was possible to identify the IRAP payment split in two instalments for the calculation of the related advances, and the negative cash flow charged to the month of December for all businesses except for those that meet certain requirements.

3.4.3 Corporate Income Tax

According to the DPCM of 27 June 2020, the deadline for the 2019 balance payment and the 2020 first advance payment was extended for taxpayers that apply the Synthetic Indexes of Reliability (ISA). Following the same logic, the "Agosto", "Ristori Bis" and "Ristori Quater" decrees extended the deadlines and broadened the population of possible beneficiaries. The 2019 IRES balance is identified in the same way used for the 2019 IRAP balance, assuming that the value of the tax due is unchanged between 2018 and 2019[10]. In order to calculate the 2020 IRES advance payment and determine the taxable base, the historical method (the value of the income that can be found in the 2018 Income Tax Return) and the forecasting method are compared, opting for the less onerous method for the enterprise. Finally, an increase is considered in the calculation of the cash flow for enterprises with a credit related to the 2019 balance and the 2020 first advance payment and it is attributed to June and July. While, a decrease is charged to December for enterprises in debt, except for those meeting certain requirements.

3.5 Other measures to support business expenditures

The "Agosto" and "Rilancio" decrees established a tax credit equal to 60% of the real estate rents for non-residential use aimed at businesses with revenues not exceeding

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[10]A similar approach was followed for the determination of the IRPEF tax base. The Irpef balance has not been taken into account in this analysis.

5 million euros in 2019[11], if they suffered a decrease in turnover for the months of March and May by at least 50% compared to the same months of the previous year. The "Ristori" and "Ristori Bis" decrees operate according to the same logic, but with specific modifications to capture the economic effects of the second wave of the pandemic. The simulation incorporates these interventions by attributing an increase in liquidity. In addition, the "Rilancio" decree allocated 600 million euros to cover the costs of electricity utilities in order to reduce the financial outlay, spread evenly over 3.7 million businesses, for the months of May, June and July.

3.6 Loan guarantees

In order to outline properly the framework of the measures implemented by the Government, it is worth considering the support provided through the introduction of the "Liquidità" decree in terms of access to credit. The "Cura Italia" and "Liquidità" decrees provided the opportunity for companies to obtain subsidised loans covered by state guarantees. In particular, until 31 December 2020, a free guarantee is provided for new loans of up to EUR 5 million per individual company. The guarantee is granted on loans of up to 6 years and the maximum amount for each individual request must be less than:

- 25% of the last year's turnover;

- twice of the beneficiary's annual wage bill (including social security charges and the cost of staff working on the company's site but formally on the subcontractors' payroll) in the last declaration;

- needs, to be attested by self-certification, for operating capital costs and investment costs in the following 18 months in the case of small and medium-sized enterprises, and in the following 12 months in the case of enterprises with no more than 499 employees.

For smaller SMEs self-certifying that they are affected by the emergence of COVID-19 and applying for new financing with:

- amounts of up to 25% of 2019 revenues and a maximum of €30,000;

- pre-amortisation of 24 months and a maximum duration of 10 years.

The Fund will guarantee 100% of the loan, free of charge and automatically, allowing the lender to disburse the sum without waiting for the final outcome of the Fund's

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[11]For economic activities with ATECO code 55 the measure was also applied to taxpayers with revenues in excess of 5 million euros.

investigation. The bank will charge the financial transaction a maximum interest rate equal to the "Rendistato".

In order to ensure transparency, the Italian Ministry of Economic Development has provided public evidence of the operators who have benefited and are benefiting from the guarantees provided, as well as the amounts involved [12]. We used this information in our analysis, increasing the liquidity of the companies by the amount of the financing obtained.

4   Main Results

Illiquid firms at the end of 2020, without any government intervention, would have experienced a liquidity deficit of 83.7 billion euros (75.5 in the case of corporates and 8.1 in the case of partnerships). Public support measures also sustained companies that, despite being subject to a contraction in their cash flows, would not have experienced a liquidity crisis in 2020. In the absence of interventions, these companies would have recorded lower cash flows equal to 19.2 billion (16.4 billion for corporations and 2.8 billion for partnerships). The aid measures enabled companies to reduce these deficits or, in some cases, to record positive liquidity surpluses. The effectiveness was particularly significant for smaller companies. In particular, the analysis shows that, approximately 68% of the estimated potential deficit has been offset by public support measures, with a residual deficit of 24.5 billion euros (Figure 2) in case of corporations; while in case of partnerships in ordinary accounting, around 77% of the estimated potential deficit was met thanks to the economic support provided by the Government (Figure 3).

These results show how public support interventions and, in particular, those in support of the debt structure and labor costs were effective in sustaining businesses during 2020. In fact, the analyses show that debt stand still and the extention of the social safety net have guaranteed total support amounting to 63 billion euros for corporations and 8.2 billion for partnerships. Nearly half of the resources flowed to sectors that were not directly affected by the restrictive measures (the no-lockdown or NLD macro-sector), but nevertheless subject to a liquidity crunch as a result of the crisis. It should also be noted that the debt stand still has secured resources amounting to 50.4 billion euros for corporations and 6.7 billion euros for partnerships.

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[12]Information is available at this link https://www.fondidigaranzia.it/

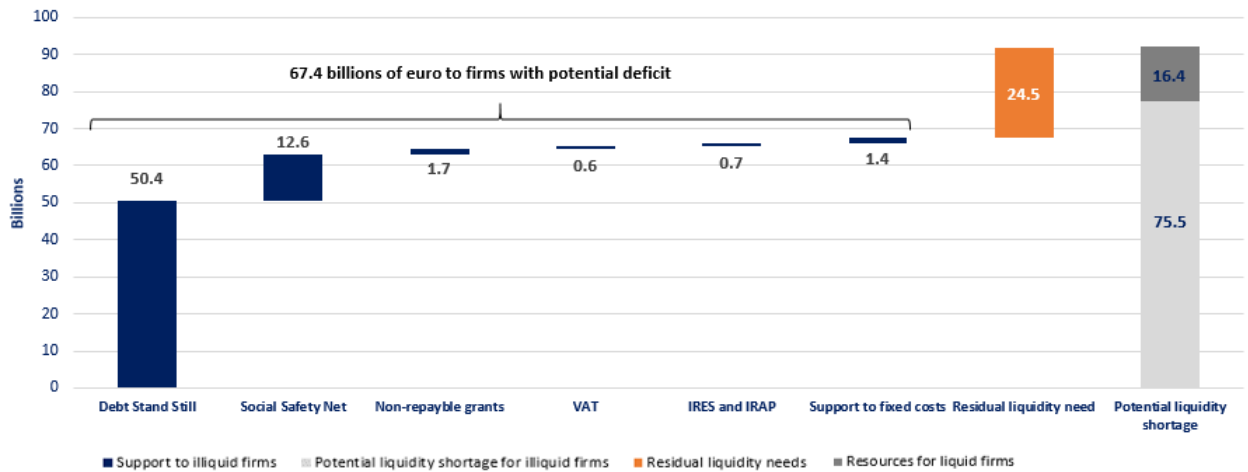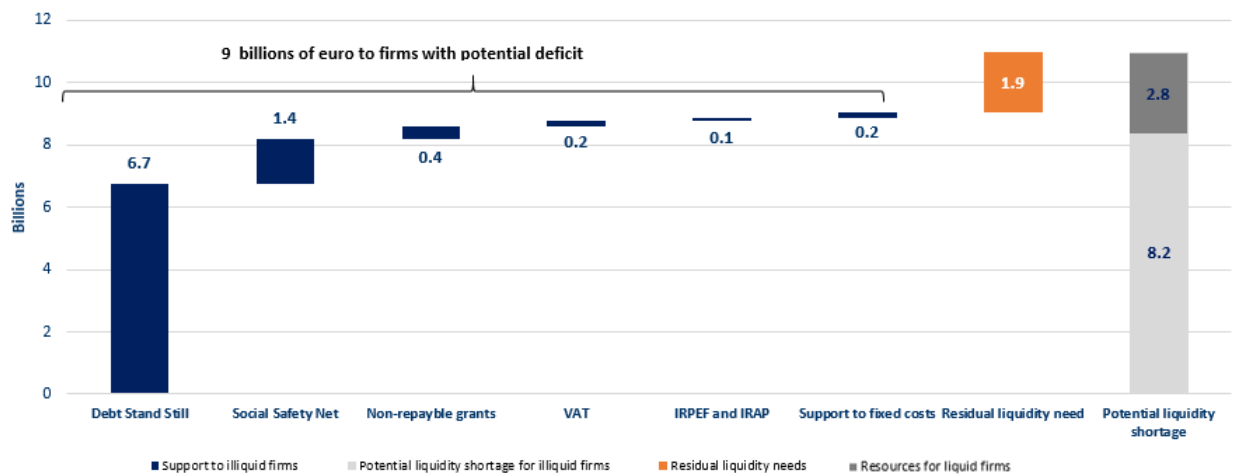Figure 2: Liquidity deficit and resources used differentiated by measures (Corporate)

Figure 3: Liquidity deficit and resources used differentiated by measures (Partnership Company)

The distributional effects of the measures adopted to cope with the crisis show how the financial support aid for some measures supporting business expenditures and non-repayable grants have proved to be particularly effective measures, in that they benefited companies in a condition of liquidity deficit at the end of 2020 or which would have become illiquid in the absence of intervention. In particular, with reference to corporations (Figure 4), approximately 67% of the resources used to cover some fixed costs have reached companies that were in the aforementioned conditions mentioned

above (a percentage that falls to 57% in the case of partnerships, Figure 5). With reference to corporations, around 1.7 billion euros of the 3.3 billions allocated as non-repayable grants went to companies that would have suffered from a lack of liquidity. A similar allocation was recorded in the case of partnerships (with 0.4 billion euros out of the 0.9 billion euros allocated for companies in potential distress). The level of effectiveness of tax suspension or exemption measures that benefited companies with a positive tax capacity (primarily associated with higher liquid funds) was lower. Within the context of corporations with reference to the suspension of VAT, only 31% of the resources reached companies with a potential liquidity deficit (0.6 billion out of a total of 2.1 billion), instead in with reference to the suspension/exemption of IRES and IRAP only 25% of the resources reached companies with a potential liquidity deficit (0.7 billion out of a total of 2.8 billion). A similar impact can also be seen with reference to partnerships.

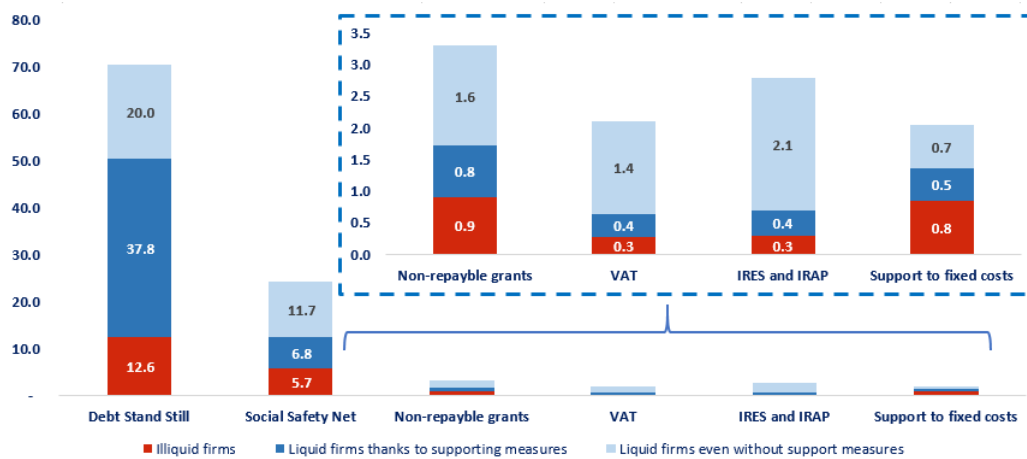Figure 4: Resources allocated by intervention area and type of beneficiary (Corporate)
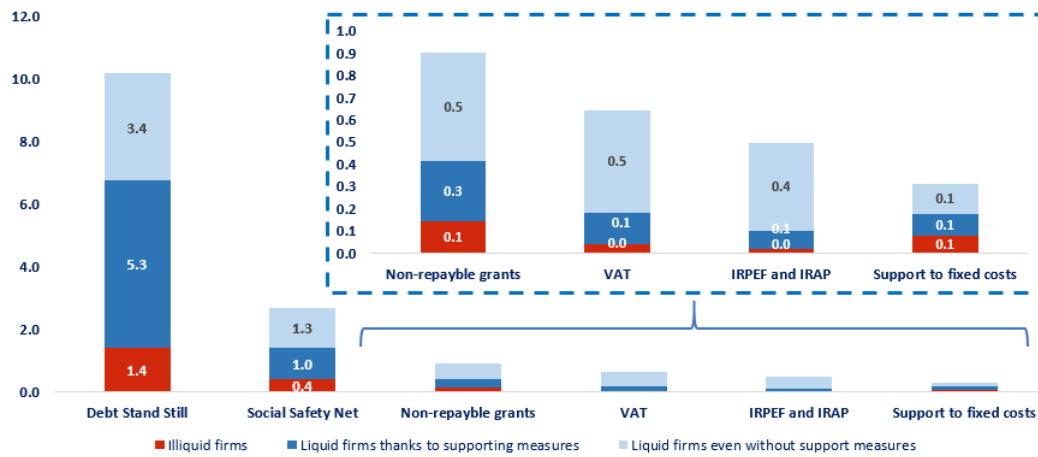
Figure 5: Resources allocated by intervention area and type of beneficiary (Partnership companies)

An overview of the impact of the measures introduced to deal with the emergency in relation to the contribution of each sector to the economy is presented in Figure 6, which shows by macro-sector the potential liquidity needs in the absence of public support measures and the residual gap after interventions. In the sectors most affected by the restrictions, the effects of the crisis were significantly contained by the interventions: in the "Tourism and Entertainment" sector, for example, the liquidity requirement was reduced from 8.2 to 2.9 billion euros, in the Construction sector from 9.9 to 2.4 billion and in the Commerce sector from 6.2 to 2.9 billion euros.

Figure 6: Potential liquidity deficit without and after public support measures and residual by Macro sector
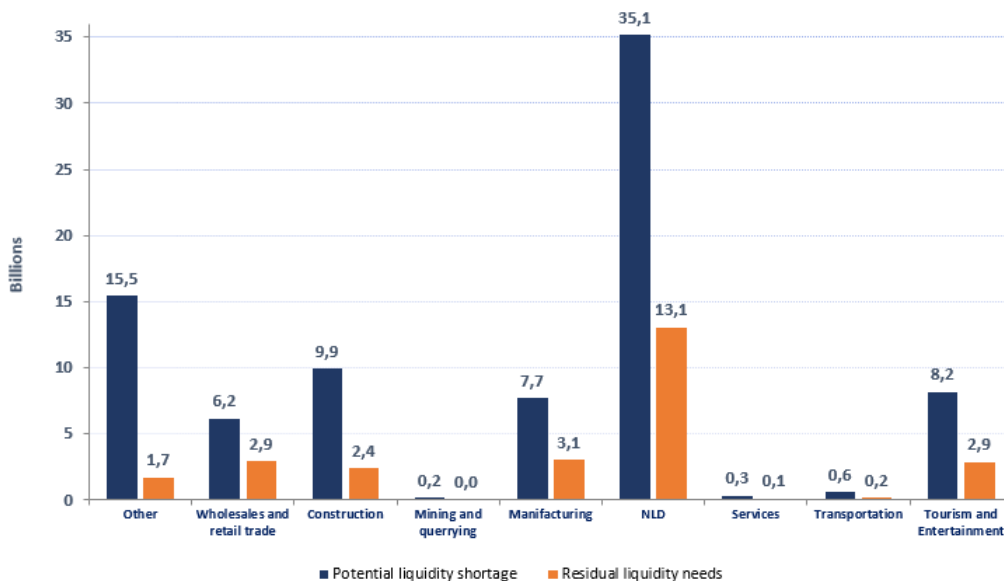
Figures 7 through 13 show the intensity of support measures by macro sector as the ratio of the share of public resources absorbed by each macro sector and the corresponding share of overall liquidity needs (bubble size). In each figure the macro-sectors are ordered according to the liquidity index defined by relating the potential deficit in terms of the turnover of each macro-sector to the total liquidity deficit in terms of the overall turnover (x-axis) and according to the indicators relevant to the various measures (y-axis). The following indicators were constructed: the relative economic weight of each macro-sector on the economy's total value added and gross profit; the incidence of fixed costs and labor costs on total costs; the incidence of value added on revenues; leverage.

Figure 7 shows that total resources have been allocated to macro-sectors, both those affected by the lockdown and those excluded (NLD), in roughly proportion to sectoral needs except for a slight preponderance for Manufacturing, which is a major contributor to the country's value added, as reflected in the relatively uniform size of the bubbles.

Figure 7: Intensity of economic support to firms differentiated by industry
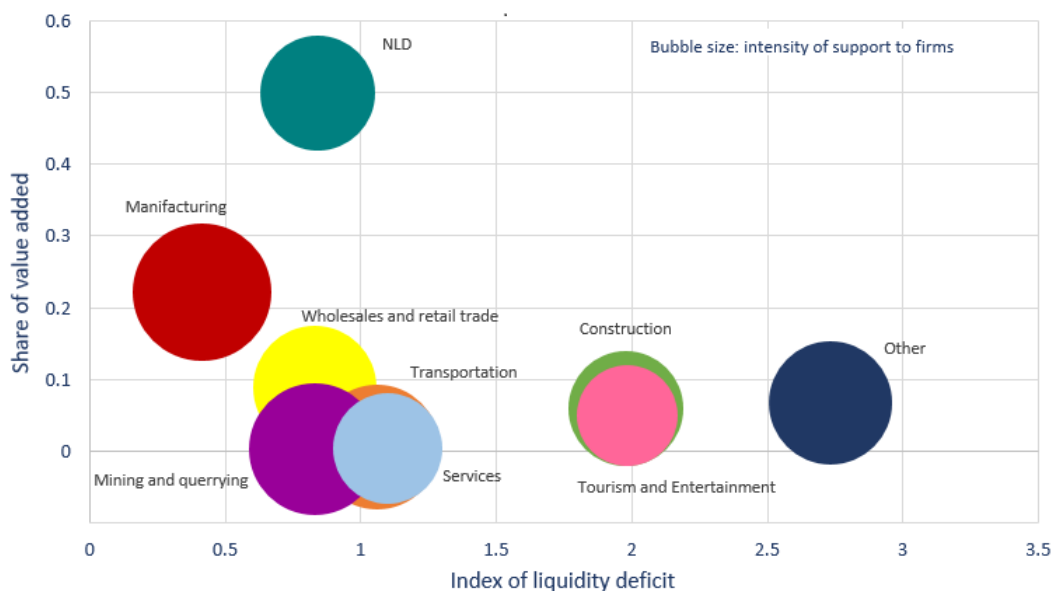
Analysis of the intensity indicator referring to non-repayable grants shows, as can be seen from Figure 13, that relatively greater amounts have been provided to the "Tourism and Entertainment" sectors (which have recorded one of the worst liquidity

crises), "Trade" and "Personal Services". The "Tourism and Entertainment" sectors, together with "Transport" and "Personal Services", have also benefited from important support through the restoration of some business expenditures, as can be seen in Figure 12. The most substantial intervention, that is, debt stand still, was concentrated to a relatively greater extent on two sectors characterized by a high level of leverage as well as a more severe liquidity crisis ("Construction" and "Other sectors") and on extractive companies, as can be seen in Figure 8. The extention of the social safety net supported above all the manufacturing, transport and personal services sectors, which, despite recording lower-than-average liquidity problems as a result of the pandemic, are characterized by a higher incidence of labor costs, as shown in Figure 9. It is worth emphasizing that for this measure - adopted from the beginning of the emergency, together with the freeze on layoffs to guarantee, first and foremost, the country's socio-economic stability and the protection of labor - support for liquidity is qualified as a secondary objective. With reference to the suspension of taxes, Commerce and Transportation seem to have benefited most from the VAT deferrals (Figure 10); on the other hand, the manufacturing sector is most affected by the IRES and IRAP deferrals together with the exemption from an IRAP payment (Figure 11). These results essentially reflect the specific structure of the value chain in the various sectors.

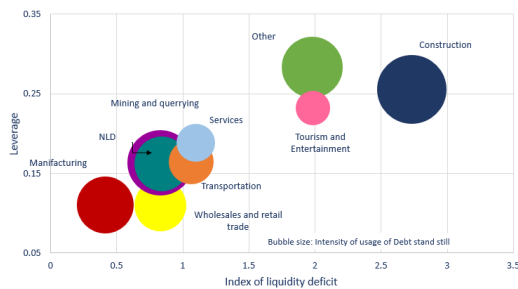Figure 8: Intensity of usage of debt standstill

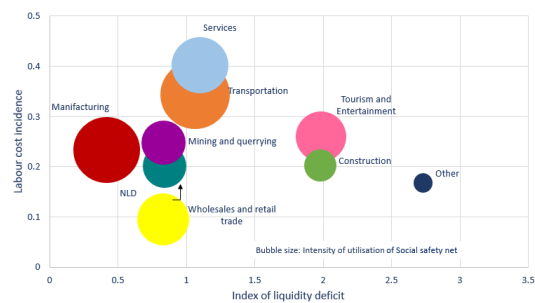Figure 9: Intensity of usage of social safety net
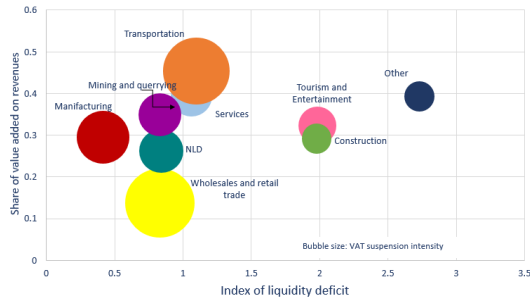
Figure 10: Vat suspension
intensity

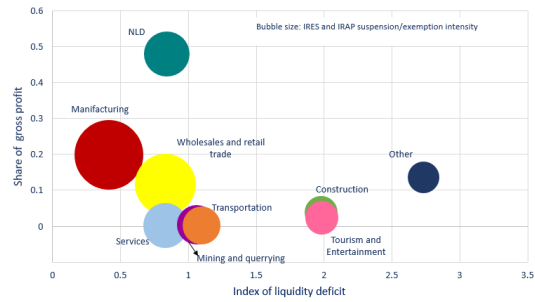Figure 11: Ires/Irpef, Irap
suspension/ exemption intensity

Figure 12: Intensity of support to
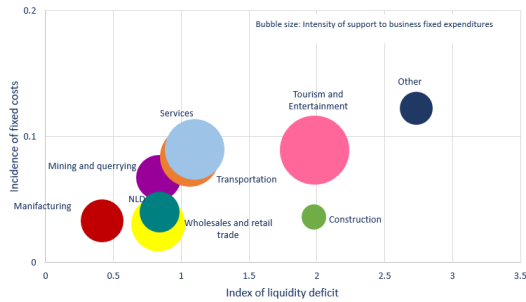business fixed expenditures

Figure 13: Intensity of utilization of
Non-repayable grants
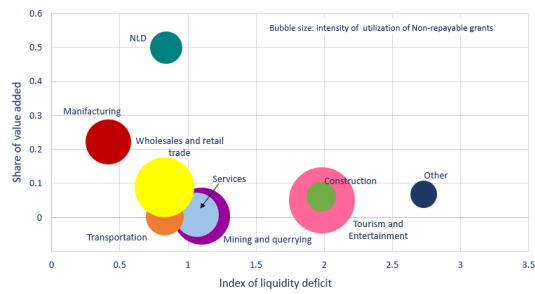
Table 1 gives an overview of the liquidity needs and the opportunities for access to credit created by the "Liquidità" Decree, distinguishing between companies which, even before the Covid-19 crisis, showed a negative operating cash flow and those with a positive cash flow. Without taking into account the facilities relating to access to credit provided for by the "Liquidità" Decree, the residual liquidity deficit estimated for the companies under study would stand at 26.5 billion euros. If the analysis includes support for business liquidity, resources totaling 8 billion euros would be retrieved and, consequently, the deficit would be reduced to 18.5 billion euros. Thanks to the aid provided by the "Fondo di Garanzia", more than 51,000 illiquid companies have been converted to liquid status. If all eligible firms had benefited from the fund, 115,000 would have moved from illiquid to liquid status and the residual need would have been around 7.7 billion. This evidence shows the low exploitation of the measure. Had the measure been fully utilised, it would have ensured an additional reduction in requirements of more than 10 billion.

Table 1: Liquidity deficit estimate before and after public support measures. Billions of euro

Operating Cash flow at 31/12/t-1	Company group	Number of firms	Liquidity deficit before public support measures			Liquidity deficit after public support measures				Residual deficit in case of access by all firms to public guarantee schemes	
			N. of illiquid firms	% of illiquid firms on total n. of firms	Amount	N. of illiquid firms	% of illiquid firms on total n. of firms	Amount	% potential liquidity deficit offset by measures	% of illiquid firms on total n. of firms	Amount
Positive	Partnerships in ordinary accounting	195,520	48,545	24.8%	5.7	11,595	5.9%	1.0	81.5%	3.8%	0.7
	Corporates	550,954	160,555	29.1%	37.3	58,821	10.7%	10.0	73.3%	6.5%	6.2
Negative	Partnerships in ordinary accounting	33,400	21,842	65.4%	2.5	12,429	37.2%	0.89	64.9%	31.8%	0.7
	Corporates	246,270	159,620	64.8%	38.2	104,004	42.2%	14.6	61.8%	33.0%	10.8
Total	Partnerships in ordinary accounting	228,920	70,387	30.7%	8.2	24,024	10.5%	1.94	76.3%	12.5%	1.5
	Corporates	797,224	320,175	40.2%	75.5	162,825	20.4%	24.5	67.5%	19.7%	17.0
	Total	1,026,144	390,562	38.1%	83.7	186,849	18.2%	26.5	68.4%	13.2%	18.5

Table 2 reports the results of the analysis of liquidity requirements by company size and shows that public support measures have proved very effective for small businesses. In particular, with reference to companies with a turnover up to 2 million euros, around 76% of the estimated potential deficit was compensated by the measures put in place, a percentage that is higher than the average compensation for all companies of 68.4%. On the contrary, the guarantees for access to credit provided for by the "Liquidità" Decree appear to have been more beneficial for larger companies.

Table 2: Liquidity deficit estimate before and after public support measures by revenue class. Billions of euro

Revenue classes (millions of euro)	Operating Cash flow at 31/12/t-1	Number of firms	Liquidity deficit before public support measures			Liquidity deficit after public support measures				Residual deficit in case of access by all firms to public guarantee schemes	
			N. of illiquid firms	% of illiquid firms on total n. of firms	Amount	N. of illiquid firms	% of illiquid firms on total n. of firms	Amount	% potential liquidity deficit offset by measures	% of illiquid firms on total n. of firms	Amount
<2	positive	651,253	184,777	28.4%	24.0	58,725	9.0%	4.1	82.9%	5.6%	2.7
	negative	257,432	168,537	65.5%	28.1	107,138	41.6%	8.4	70.1%	33.4%	6.7
2-10	positive	79,442	21,256	26.8%	13.1	9,993	12.6%	4.2	68.1%	7.3%	2.6
	negative	18,449	11,021	59.7%	8.1	7,842	42.5%	4.1	49.0%	28.0%	2.8
10-50	positive	15,779	3,067	19.4%	5.9	1,698	10.8%	2.7	53.7%	5.8%	1.7
	negative	3,789	1,904	50.3%	4.5	1,453	38.3%	2.9	35.1%	24.4%	2.0
Total	<2	908,685	353,314	38.9%	52.0	165,863	18.3%	12.5	76.0%	13.5%	9.4
	2-10	97,891	32,277	33.0%	21.3	17,835	18.2%	8.3	60.8%	11.2%	5.4
	10-50	19,568	4,971	25.4%	10.4	3,151	16.1%	5.6	45.6%	9.4%	3.7
	Total	1,026,144	390,562	38.1%	83.7	186,849	18.2%	26.5	68.4%	13.2%	18.5

Table 3 shows that the Government's decision to direct some support measures towards smaller companies has proved more effective. In fact, the liquidity needs of the sectors that have suffered most from the crisis are concentrated on companies with turnover of up to 2 million euros: around 80% in the "Other" and "Construction" sectors; 70% in the "Tourism and Entertainment" sector, which, however, has received less public support.

Table 3: Liquidity deficit estimate before and after public support measures by sector and dimension. Billions of euro

Macro-sector	Revenue class (million euros)	N. of firms by revenue class	% of firms by revenue class	Liquidity deficit (counterfactual)				Residual liquidity deficit	% of liquidity deficit offset by measures
				Illiquid firms		Liquidity deficit			
				Total amount	%	Total amount (billion euros)	%	Total amount (billion euros)	
Other	<2	166,263	97.5%	65,969	97.8%	12.84	83.0%	1.21	90.5%
	2-10	3,725	2.2%	1,347	2.0%	2.22	14.3%	0.31	86.0%
	10-50	458	0.3%	125	0.2%	0.41	2.7%	0.22	47.9%
	Total	170,446	100.0%	67,441	100.0%	15.47	100.0%	1.74	88.7%
Wholesales and retail trade	<2	106,835	84.1%	36,747	86.7%	2.93	47.4%	1.18	59.7%
	2-10	16,747	13.2%	4,765	11.2%	1.93	31.2%	0.91	53.1%
	10-50	3,487	2.7%	865	2.0%	1.32	21.4%	0.85	35.6%
	Total	127,069	100.0%	42,377	100.0%	6.18	100.0%	2.94	52.5%
Construction	<2	97,871	94.2%	38,861	96.2%	8.07	81.4%	1.71	78.8%
	2-10	5,480	5.3%	1,416	3.5%	1.35	13.6%	0.52	61.1%
	10-50	550	0.5%	133	0.3%	0.50	5.0%	0.19	61.3%
	Total	103,901	100.0%	40,410	100.0%	9.91	100.0%	2.43	75.5%
Mining and quarrying	<2	1,255	80.9%	577	86.4%	0.11	60.4%	0.03	76.9%
	2-10	268	17.3%	86	12.9%	0.06	33.9%	0.02	75.2%
	10-50	29	1.9%	5	0.7%	0.01	5.7%	0.00	56.7%
	Total	1,552	100.0%	668	100.0%	0.18	100.0%	0.05	75.2%
Manufacturing	<2	68,931	74.6%	25,934	79.9%	3.01	39.1%	1.03	65.7%
	2-10	18,756	20.3%	5,502	17.0%	2.73	35.5%	1.07	60.7%
	10-50	4,762	5.2%	1,021	3.1%	1.96	25.4%	0.95	51.7%
	Total	92,449	100.0%	32,457	100.0%	7.70	100.0%	3.05	60.4%
NLD	<2	374,120	86.3%	125,532	86.8%	18.83	53.6%	5.38	71.4%
	2-10	49,339	11.4%	16,537	11.4%	10.84	30.9%	4.67	56.9%
	10-50	9,908	2.3%	2,596	1.8%	5.46	15.5%	3.02	44.7%
	Total	433,367	100.0%	144,665	100.0%	35.13	100.0%	13.07	62.8%
Services	<2	8,526	98.2%	4,334	97.9%	0.25	71.7%	0.09	65.6%
	2-10	142	1.6%	89	2.0%	0.09	25.8%	0.04	56.7%
	10-50	14	0.2%	6	0.1%	0.01	2.5%	0.00	75.4%
	Total	8,682	100.0%	4,429	100.0%	0.34	100.0%	0.13	63.5%
Transportation	<2	2,764	84.7%	1,752	86.3%	0.28	47.6%	0.07	73.6%
	2-10	413	12.7%	245	12.1%	0.22	37.7%	0.05	76.6%
	10-50	86	2.6%	33	1.6%	0.09	14.7%	0.04	57.6%
	Total	3,263	100.0%	2,030	100.0%	0.58	100.0%	0.16	72.4%
Tourism and Entertainment	<2	82,120	96.1%	53,608	95.6%	5.74	70.1%	1.78	68.9%
	2-10	3,021	3.5%	2,290	4.1%	1.84	22.5%	0.75	59.2%
	10-50	274	0.3%	187	0.3%	0.61	7.4%	0.37	39.5%
	Total	85,415	100.0%	56,085	100.0%	8.18	100.0%	2.90	64.6%
Total	<2	908,685	88.6%	353,314	90.5%	52.04	62.2%	12.49	76.0%
	2-10	97,891	9.5%	32,277	8.3%	21.28	25.4%	8.34	60.8%
	10-50	19,568	1.9%	4,971	1.3%	10.36	12.4%	5.64	45.6%
	Total	1,026,144	100.0%	390,562	100.0%	83.7	100.0%	26.5	68.4%

5   Conclusions

The analysis of the effects of the Covid-19 crisis, based on microsimulation at firm level of operating cash flows, shows that the support measures adopted by the Government allowed companies to significantly offset the liquidity deficit. In particular, the results show that: in the case of corporations, around 68% of the estimated potential deficit was offset by measures to deal with the emergency (a deficit of 24.5 billion euros remains out of a potential deficit of 75.5 billion euros); in the case of partnerships in ordinary accounting, around 77% of the estimated potential liquidity needs were offset by government support (a deficit of 1.9 billion euros remains out of a potential deficit of 8.2 billion euros). These results highlight how effective the government's efforts were in supporting businesses during 2020. This efficacy was particularly relevant for smaller firms, which, regardless of industry, are most severely affected by the health

crisis and are significantly prevalent in sectors that experienced the most severe liquidity crises.

The analysis carried out in this report has measured the effectiveness of the various intervention measures adopted to attenuate the liquidity needs of companies, which have drastically increased as a result of the pandemic crisis. In this regard, the debt stand still, the other measures to support business expenditures and the non-repayable grants have proved to be particularly effective measures, i.e., capable of supporting those companies that have actually experienced a liquidity deficit. On the other hand, the tax suspension or exemption measures, which also benefited companies that did not have a liquidity shortage, were less effective and selective. In other words, the ranking of the measures relative to effectiveness shows that less selective interventions, such as tax suspension, can disperse considerable resources with respect to the objective of reducing liquidity deficit, with non-negligible policy implications. Conversely, debt stand still, the relief of certain fixed costs and non-repayable grants were found to be more effective, at least as far as micro, small and medium-sized enterprises are concerned.

The work also contains a preliminary analysis of the efficiency of public support measures, assessing their impact for those economic sectors that contribute most significantly to value added. These results, however, cannot provide conclusive guidance, since a rigorous analysis of the efficient use of resources allocated to liquidity support should also incorporate the evaluation of the risk of insolvency in order to analyze the capacity of the different liquidity support measures to support companies that are actually able to recover competitiveness and, in this way, contribute to the recovery of the economy. It is important to recall in this regard the indications contained in the G30 report on the restructuring of corporations after Covid-19. The report recognizes that the pandemic crisis called for an immediate and generalized response to the liquidity problem, but highlights the need to deal differently with the subsequent phase in which the liquidity problem can turn into a more serious solvency problem. In this phase, in fact, it is necessary to ensure that public intervention is selective in the choice of priorities and sectors to which incentive measures should be directed, so as to ensure a prospect of stability for all companies that can support the resilience and long-term growth of the economy, keeping the cost to public financing to a minimum.

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