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THE LAW OF THE STRONGEST? EXPLORING THE DRIVERS OF FIRM PERFORMANCE DURING THE COVID-19 CRISIS

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ABSTRACT/RESUME

The law of the strongest? Exploring the drivers of Firm Performance during the COVID-19 Crisis

Using data on more than 150.000 non-financial companies operating in both manufacturing and services sectors around the world, we analyse the drivers of firm performance throughout the whole COVID cycle (until end 2021). We highlight three key results. First, if anything, larger and older firms did worse than smaller and younger ones in terms of revenues and investment spending, both during COVID-19 and the subsequent recovery. Even in sectors that were under scrutiny from a competition standpoint, such as technology and healthcare, larger firms did not systematically over-perform. Second, ex-ante financial strength attenuated the effects of the shock on revenues during the COVID cycle. Third, there is some evidence of debt overhang: firms that entered the crisis with a higher leverage ratio invested less than others, including on R&D, both in 2020 and in 2021, while firms that became more debt-burdened during the pandemic tended to record weaker investment spending during the recovery. These insights shed light on market power, competition, and more generally on the performance of the corporate sector since the start of COVID-19 pandemic.

JEL Classification Numbers: D25, G01, G32, L25

Keywords: COVID-19, corporate sector, firm performance, financial fragility, debt overhang, market power, competition, investment, firm size.

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La loi du plus fort ? Étudier les déterminants de la performance des entreprises pendant la crise liée au COVID-19

En exploitant des données sur plus de 150 000 entreprises non financières opérant dans le secteur de l'industrie et celui des services à travers le monde, nous avons analysé les déterminants de la performance des entreprises sur toute la durée du cycle du COVID-19 (jusqu'à la fin de 2021). Trois résultats clés ont été mis en évidence. Premièrement, les entreprises les plus grandes et les plus anciennes se sont moins bien défendues en termes de recettes et de dépenses d'investissement, que les entreprises de plus petite taille et plus jeunes, que ce soit pendant la pandémie ou au cours de la reprise qui l'a suivie. Même dans les secteurs qui faisaient l'objet d'une surveillance du point de vue de la concurrence, par exemple la technologie ou les soins de santé, les entreprises les plus grandes n'ont pas systématiquement obtenu de meilleurs résultats. Deuxièmement, il est clair que les entreprises financièrement plus solides avant la crise ont moins souffert du point de vue des recettes pendant le cycle du COVID. Enfin, il existe des signes de surendettement excessif : les entreprises déjà très endettées au déclenchement de la crise ont investi moins que les autres, y compris dans la R&D, en 2020 comme en 2021, et celles qui sont devenues plus endettées pendant la pandémie ont souvent eu des dépenses d'investissement plus faibles pendant la phase de reprise. Ces éléments apportent des éclairages sur le rôle du pouvoir du marché, la concurrence et plus généralement les performances du secteur des entreprises depuis le début de la pandémie de COVID-19.

Codes de classification JEL : D25, G01, G32, L25.

Mots-clés : COVID-19, secteur des entreprises, performance des entreprises, fragilité financière, endettement excessif, pouvoir de marché, concurrence, investissement, taille des entreprises.

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The law of the strongest? Exploring the drivers of firm performance during the COVID-19 crisis

By Guido Franco, Mauricio Hitschfeld, Álvaro Pina and Damien Puy[1]

1. Introduction

1. Since the very start of the COVID-19 crisis, the level of stress in the corporate sector has taken a central place in the policy debate. Reflecting the 2007-09 experience with the global financial crisis (GFC), two key concerns quickly emerged when it became clear that the COVID pandemic would be of unprecedented magnitude (Bartik et al., 2020). The first was that smaller or younger firms, which tend to be financially more vulnerable, would likely bear the brunt of the crisis, potentially leaving deep economic scars (Gourinchas et al., 2020; OECD, 2020; Delanote et al., 2021; Demmou et al., 2022). The exit or the inability to grow of many small or medium sized firms, in particular, could hurt business dynamism and weaken competition, at a time when key indicators of market power were already at an all-time high (Akcigit et al, 2021; IMF, 2019, Duval et al. 2021; Rose, 2020). The second concern focused on a potential debt overhang effect. Even assuming firms could be rescued, most would have to weather the storm by accumulating more debt, which would negatively affect their investment plans during the recovery and potentially beyond (Barbiero et al., 2020; Demmou et al., 2021; FSB, 2021). Besides acting as a major drag on the medium-term outlook, subdued investment could stifle innovation and long-term growth, especially if firms were to cut the riskiest and most innovative part of their investment, such as R&D spending.

2. This paper investigates whether those concerns materialised by analysing the revenue and investment performance of more than 150,000 non-financial companies, listed and non-listed, from both manufacturing and services sectors, operating in more than 50 countries, throughout the whole COVID cycle. We focus on two specific questions: (i) how did smaller, younger or financially more fragile firms perform relative to their larger, older or financially healthier peers? and (ii) is there any early evidence of a debt overhang effect? We tackle these questions by examining the relationship between some pre-COVID-19 firm characteristics – such as size, age and financial fragility - and firm performance, both during the COVID-19 pandemic (in 2020) and the subsequent recovery (in 2021). In line with most of the

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literature, we define financially fragile firms as companies with a higher leverage ratio, lower interest coverage, a larger share of short-term debt or a smaller share of liquid assets on their balance sheet, and measure "performance" alternatively by firm revenues or capital and R&D expenditures. We measure firm size by total assets and use firm age to complement size in defining how well-established a firm is in its industry.

3. Empirically, we use a difference-in-differences approach exploiting data between 2019 and 2021 (three years) as a baseline, as well as a set of cross-sectional regressions to check the consistency of our findings. While both approaches have their own advantages and drawbacks, they yield very similar results, confirming that our key findings are not dependent on the specific methodology we use. In both cases, we resort to a rich fixed effects structure and a wide range of controls to infer the impact of given baseline firm characteristics on firm performance. For instance, in the former approach, we introduce (i) industry-country-year fixed effects at a very granular level to capture aggregate demand or supply shocks operating at the country-sector level and (ii) firm fixed effects to absorb any residual unobserved firm-specific heterogeneity not captured by firm-specific controls. The differential effect of a baseline firm characteristic – say size - is then identified by interacting a COVID (Recovery) dummy taking the value one in 2020 (2021) with that characteristic, measured as of 2019. In the case of firm size, this amounts to comparing the performance of larger firms to their smaller peers over a specific period and within a very narrowly defined country-sector (e.g., large retailers to small retailers, both in France, during COVID). The fact that all firm characteristics are measured at the end of 2019 – i.e., before the crisis hit - also reduces reverse causality issues.

4. We highlight three key results. The first is that, if anything, relatively larger and older firms did worse than smaller and younger ones on most metrics, both during COVID-19 and the recovery. All else equal, they saw a larger decrease in revenues or reduced their investment by more than their smaller, younger counterparts. Sub-sample analysis also reveals that the underperformance of large firms in terms of revenues is driven by firms operating in advanced economies, where the rise in various measures of corporate power has been the strongest over the last 30 years and policy support was more generous (Akcigit et al, 2021). We find that a key distinction in the relative performance of smaller and larger firms lies in whether the sector was expanding or contracting over the COVID-19 cycle. In contracting industries, the underperformance of larger firms in terms of revenues is significant, suggesting that relatively smaller firms might have actually gained market shares at the expense of larger ones in sectors that were hit harsher by the pandemic. In contrast, the effect of firm size is either muted or reversed (with a small positive and statistically significant differential effect for larger firms) in expanding sectors. However, we find no sign of an over-performance of larger firms in sectors that both tended to prosper during the pandemic and were under scrutiny from a competition standpoint, such as technology and health care. Taken together, these results suggest that the COVID-19 crisis did not, at least until 2021, generate a large and systematic increase in the market power of the most dominant firms.

5. Our second key finding is that *ex-ante* financial strength clearly attenuated the effects of the shock during the crisis. Firms that entered the pandemic in worse financial shape – with a higher leverage ratio, a higher debt service burden or a higher share of short-term debt – did generally worse in terms of revenues, both during the crisis and the recovery. This result is robust across country groups and survives when splitting the sample between "contracting" and "expanding" sectors.

6. Our third key finding is that there is some evidence of debt overhang in the corporate sector. Firms with a higher debt-to-assets ratio in 2019 tended to invest less than others both in 2020 and in 2021 compared to 2019, both as regards tangible capital expenditures and R&D spending. However, a similar result is not observed for other metrics of financial fragility. In addition, we find that firms that became more financially fragile during the pandemic (i.e., that saw an increase in their debt burden or became less liquid) reduced their capital spending more than others during the recovery (in 2021).

7. This paper naturally relates to the literature exploring the effect of the COVID crisis on the corporate sector. In the absence of actual data on firm performance, a first strand of literature relied on simulations to assess the likelihood of a wave of corporate insolvencies - in particular among smaller and more financially fragile firms - and its consequences for the competition landscape (Gourinchas et al.,2020; Tressel and Ding, 2021; Demmou et al., 2022). A second and closely related strand of research relied on stock prices as proxies of firm performance to determine the key variables affecting performance in the early stages of the pandemic. Using data on listed firms, Ding et al. (2021) and Fahlenbrach et al. (2021) both pointed to an underperformance of more financially fragile listed firms.[2] A third strand of literature used country-specific firm-level data to understand the impact of the COVID-19 shock on various dimensions of firms' performance, such as employment, survival and productivity. For instance, Cros et al. (2021) show that predictors of firm failure (mainly high indebtedness and low productivity) did not change during 2020 in France compared to the pre-pandemic period; Piette and Tielens (2022) find similar results for Belgium, while Andrews, Charlton and Moore (2021) show that high productivity and tech-savvy firms were less impacted in Australia, New Zealand and United Kingdom.

8. A key contribution of our paper is to analyse firm performance (i) based on actual data for a large cross-country sample of both listed and unlisted firms and (ii) over the whole COVID-19 cycle, including the recovery period. Our results are in line with the literature in showing that *ex-ante* financial health still played a role, despite the unprecedented policy support deployed to alleviate potential financial constraints. However, contrary to previous evidence that small firms tend to perform worse than their larger counterparts during a crisis (Gandhi and Lusting, 2015), we find no evidence of a "size" premium. At least during the COVID-19 crisis, being relatively smaller or younger did not hurt firms' performance, which has important implications for the competition landscape. Admittedly, our results do not speak to small and very small firms, nor to very young firms or start-ups, which are largely absent from our sample, often for reasons of data coverage and reliability. Nonetheless, the sample of firms we analyse is much larger than in other studies thanks to the inclusion of a very large number of unlisted firms, and well suited to tackle competition issues.

9. Finally, our findings also relate to the literature investigating the potential implications of a debt overhang of non-financial corporations, especially following systemic crises such as the GFC. For instance, Kalemli-Ozcan et al. (2022) find that over-indebtedness contributed to almost half of the decline in firms' investment caused by the GFC. More generally, Hennessey et al. (2007) and Barbiero et al. (2020) show that, on average, higher debt is associated with lower capital investment. The timely availability of 2021 balance sheet data for a wide range of firms allows us to enrich this literature by providing early evidence and preliminary estimates of a potential debt overhang effect in the aftermath of the COVID-19 shock.

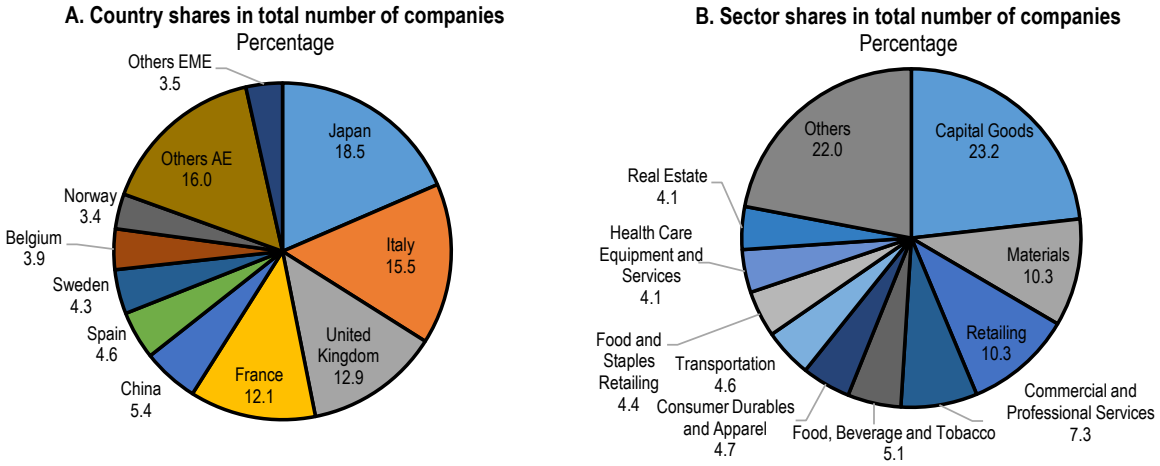
10. The rest of this paper is organised as follows. Section 2 presents our sample and reports descriptive evidence on different aspects of firm performance during the COVID-19 pandemic and the subsequent recovery. Section 3 discusses our econometric framework, and Section 4 reports the ensuing results. Section 5 concludes.

[2] Using data on 6,700 firms in 61 countries, Ding et al (2020) found that a drop in stock returns was milder among firms with stronger pre-2020 finances (more cash and undrawn credit, less total and short-term debt, and larger profits). Fahlenbrach et al. (2020) found that firms with high financial flexibility -- more cash, less short-term debt, and less long-term debt at the end of 2019 - within an industry experienced a stock price drop that is 26%, or 9.7 percentage points, lower than those with low financial flexibility.

2. Data and stylised facts

11. Data at the firm level comes from the S&P Capital IQ database (CIQ), which collects financial and economic information on a very large number of listed and unlisted companies operating in all industries in both advanced and emerging markets.[3] For this paper, we used standard profit and loss (P&L) and balance sheet statistics for three consecutive fiscal years: FY 2019 (pre-crisis), FY 2020 (COVID-19) and FY 2021 (the recovery).[4] We restrict the sample to companies with (i) non-missing revenues over the three consecutive years and (ii) a minimum annual turnover of USD 15 million in 2019.[5] After standard cleaning steps[6], we end with a panel of about 158,000 companies, of which 144,000 are in advanced economies (AE) and 14,000 operate in emerging market economies (EME), mostly in China. Firms headquartered in OECD countries represent about 90% of the sample, with Japan, Italy, the United Kingdom and France accounting for the largest shares (Figure 1, panel A). The complete country coverage is reported in the Appendix (Table A.1).

Figure 1. Country and sector coverage



Note: Panel B corresponds to industry sectors at 2-digit level (CIQ2).
Source: Authors 'calculations based on the S&P Capital IQ database.

12. In terms of sectors, CIQ builds on the Standard Industrial Classification (SIC) to construct its own classification at the 1 to 3-digit level. We use the 2 and 3-digit level classifications, which include 21 and 61 sectors respectively (see Appendix Table A.2). At the 2-digit level, we find that Capital Goods, Materials, Retailing and Commercial & Professional services represent about 51% of the total number of firms in our sample (Figure 1, panel B).

[3] The S&P Capital IQ database provides firms consolidated annual statements and thus firms (with their direct subsidiaries) are allocated to their headquarters country. Approximately 13% of the firms in our sample are listed, and thus most firms are privately held.

[4] For simplicity, in the remainder of the paper, we use only the year (e.g., 2019) to refer to the fiscal year. Moreover, the year variable is adjusted back one year whenever the fiscal month occurs before June (included). Admittedly, the labels "pre-crisis", "Covid-19" and "Recovery" for 2019, 2020 and 2021 respectively are stylised, since the timing of the pandemic peak(s) and the recovery did not perfectly coincide across countries and sectors, but nonetheless broadly in line with aggregate GDP developments.

[5] We use that limit to maximize data coverage and reliability. Below that level of revenues, many firms do not report any other variables, which prevents us from using these observations in much of our analysis.

[6] Firms with (i) negative values for revenue or assets or (ii) that did not belong to any country or sector are removed.

13. For each firm in our sample, we collect standard profit and loss (P&L) variables: (i) *Revenue,* corresponding to total sales (ii) *EBITDA* (earnings before interest, taxes, depreciation, and amortization), to capture firms' profits (iii) *Capital expenditure (Capex)*, defined as outflows towards purchase of plant, property and equipment and (iv) *R&D expenditure,* defined as expenses for the development of a new product, innovation relating to technology formulation or process development. We also recover the *Interest Coverage Ratio* (ICR), defined as the ratio of a firm's EBITDA to its interest expenses. We then collect standard balance sheet items: (i) *Debt,* defined as total debt (ii) *Short-term debt,* defined as the stock of debt to be repaid within one year (iii) *Equity* (iv) *Total assets* (v) *Short-term assets*, defined as cash and equivalent and (vi) *Inventories,* defined as all finished goods, work in progress or raw materials. Finally, we create a *Listed* dummy to capture whether the firm is publicly held and its common stock is actively trading on any public stock exchange, and compute firm *Age*, as the difference between 2019 and the year the company was founded. Table 1 provides summary statistics on each variable.

Table 1. Summary statistics (USD million unless otherwise indicated)

Variable	Number of observations			Median, USD million (1)		
	2019	2020	2021	2019	2020	2021
Revenue	158,383	158,383	158,383	35.50	35.10	37.00
Ebitda	140,363	140,700	140,689	2.20	2.10	2.60
Capex	28,674	28,629	28,440	9.20	9.00	10.60
R&D expenditure	10,200	10,354	10,485	5.89	6.70	8.10
ICR (ratio)	75,134	107,984	109,597	11.70	11.40	14.90
Debt	114,828	139,425	142,290	5.10	5.60	5.30
Short-term debt	93,447	118,312	120,581	2.70	2.40	2.30
Equity	157,814	158,109	158,168	9.90	11.50	11.80
Inventories	135,427	142,826	143,085	3.50	3.20	3.40
Assets	158,356	158,174	158,174	29.10	32.50	32.70
Short-term assets	153,353	154,522	154,254	3.00	4.00	3.80
Firm age (as of 2019)	126,739	126,739	126,739	30.00	30.00	30.00
Cash-to-assets (ratio)	153,348	154,492	154,182	0.10	0.13	0.12
Short-term debt-to-Debt (ratio)	88,651	109,193	110,711	0.67	0.54	0.55
Inventories-to-assets (ratio)	135,426	142,806	143,045	0.12	0.10	0.11
Debt-to-assets (ratio)	114,828	139,398	142,213	0.19	0.20	0.19

Note: (1) Unless otherwise indicated in the variable name.
Source: Authors 'calculations based on the S&P Capital IQ database.

14. Table 1 highlights that not all firms report all variables. By construction, the coverage is maximal for revenues and very high for standard balance sheet items, such as assets (total and short-term), equity, profits, and inventories. However, an ICR can be computed for only about half of the firms and very few report their investment or R&D spending. The interpretation of some of the results will thus vary with the sample of firms for which data is available. For instance, results pertaining to Capex and R&D expenditures are mainly driven by large and very large corporations, respectively. In addition, our sample is tilted towards medium-sized and large firms - with a median income of roughly 35 USD Million in 2019 – and relatively well-established firms - with a median age of 30 years.[7] Therefore, our results do not speak to the performance of small (or very small) companies or start-ups during the COVID-19 pandemic. At the same time, we considerably expand the sample of firms analysed so far in the literature on a cross-country basis

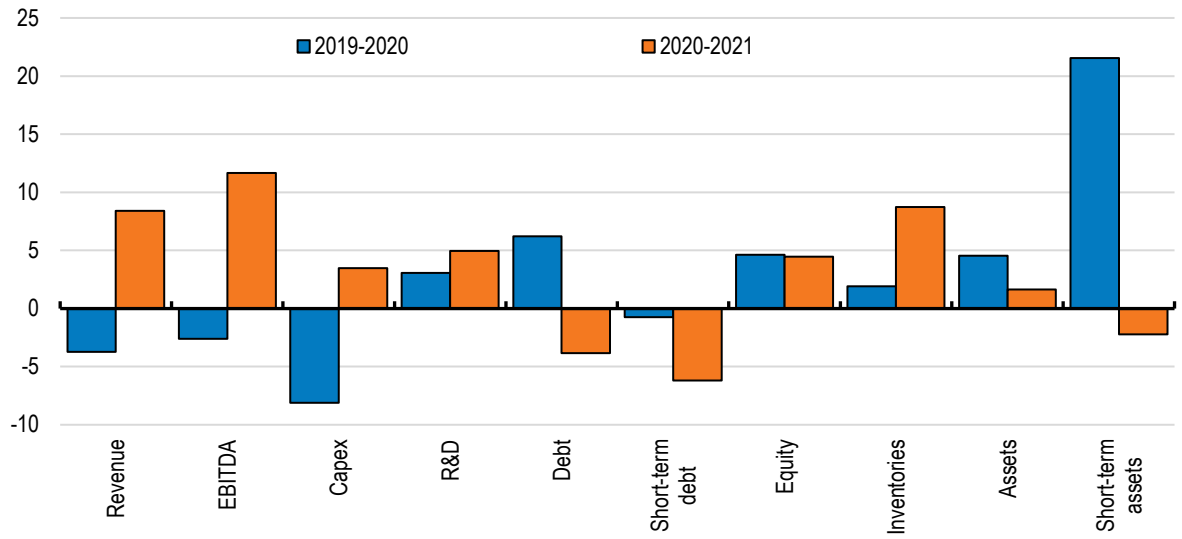
[7] Small and medium-sized enterprises are usually defined as enterprises which employ less than 250 persons and have an annual turnover not exceeding USD 50 million. Similarly, firms are usually considered as old if they are more than 10 years old.

and by doing so cover a large sample of medium-sized companies, whereas earlier studies (i.e. Ding et al., 2021; Fahlenbrach et al., 2021) with smaller samples have focussed almost exclusively on large firms. We also find a positive correlation between aggregate revenue growth at the country level and nominal GDP growth (Appendix, Figure A.1), which suggests that the sample captures some of the cross-country variability in macroeconomic performance.[8]

15. We now turn to the dynamics of the different variables over the whole COVID-19 cycle. Corporate performance deteriorated substantially in 2020 (Figure 2): revenues, profits and investment spending were severely affected, while debt and short-term assets (i.e., cash) increased significantly. The situation then improved markedly during the recovery period (2021). This broad picture holds for both firms in AE and EME. However, Chinese firms stand out as an exception, as they clearly outperformed their peers both during the crisis and the recovery period (Appendix, Figure A.2), mirroring to some extent the much stronger growth of the Chinese economy over 2020-21. We have thus excluded Chinese firms from our baseline empirical analysis, as their inclusion would significantly weigh on results at the EME and even global levels.

Figure 2. Changes in key firm variables: 2019-2020 and 2020-2021

Median company, percent change



Note: We report the weighted median for each variable, using firms' assets size as weights and excluding China.
Source: Authors' calculations based on the S&P Capital IQ database.

16. We also observe very large heterogeneity in performance across industries (Figure 3). Unsurprisingly, those heavily dependent on physical interactions and the movement of goods and people, such as the consumer services sector (e.g., hotels, restaurants and leisure), the energy sector (oil and gas), airlines, and automobiles & components all saw their revenues fall in 2020, while those operating in tech, IT and health-related sectors (e.g., semiconductors, software, biotechnology, pharmaceuticals, etc.) expanded strongly. However, some of the most affected industries saw their revenues bounce back strongly in 2021 (Figure 3). In our sample, 10 out of 61 sectors were still below their pre-crisis levels of

[8] The correlation with GDP is simply illustrative since (i) revenues for multinationals are booked in one country in the CIQ database, even when they have been generated in multiple countries (ii) our sample is not representative of all companies in each country (i.e., it is not a census). As a result, a perfect correlation should not be expected.

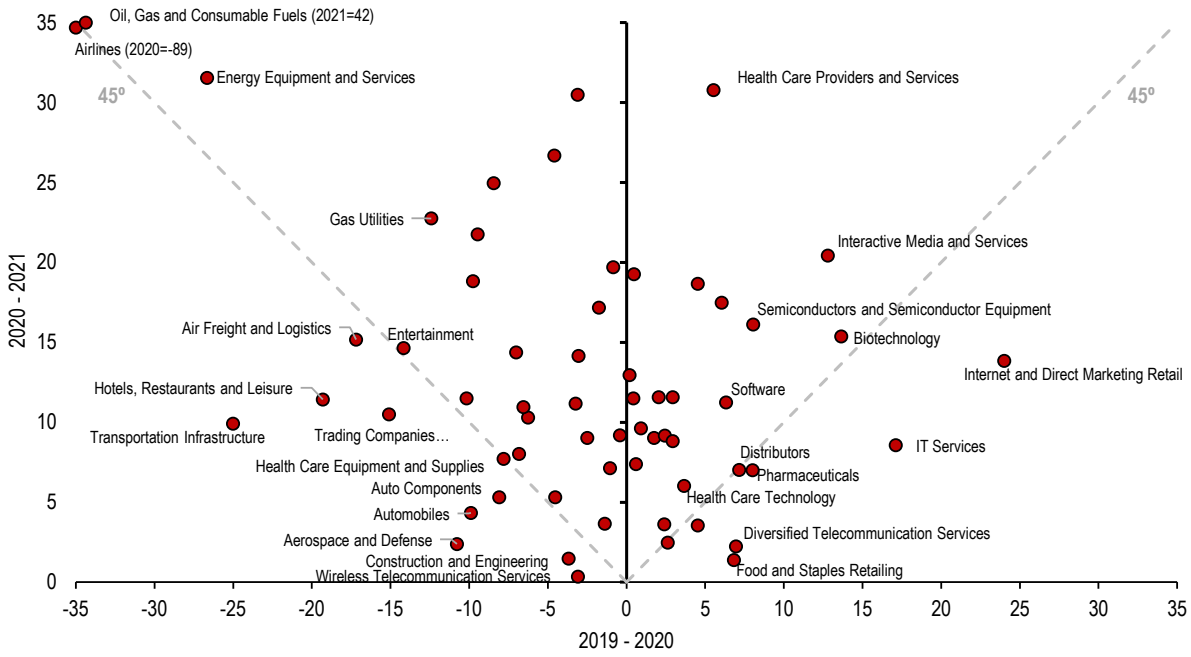
revenues in 2021, mostly related to air transport, hospitality, cars and components and transportation infrastructure. These findings broadly apply to the dynamics of EBITDA throughout the COVID-19 cycle, though with sectors like automobiles or hospitality rebounding more strongly than in the case of revenues (Appendix, Figure A.3).

17. We also find a large cross-sector heterogeneity in the behaviour of investment (Figure 4). Mirroring revenues, capex dropped dramatically in those sectors most affected by the pandemic. However, the recovery in investment has been slower, with aggregate capital expenditures in 2021 still short of 2019 levels in many industries. In contrast, R&D did not decrease much during the pandemic (except for a few sectors mainly concerning cars, energy and transportation) and expanded strongly, in some sectors, during the recovery (Appendix, Figure A.4). However, only few, and mostly very large, firms report their R&D spending: for those which do, the difference in behaviour between R&D and investment expenditure somewhat narrows (Appendix, Figure A.5).

18. Finally, we find very large heterogeneity across firms within sectors (Figure 5). Even though most sectors had recovered in terms of aggregate revenues by 2021, only 60% of firms, on average, had done so within each sector. A similar finding applies to other key metrics such as profits and investment, and even to R&D spending despite its overall resilience throughout the COVID cycle. We investigate the drivers behind this heterogeneity in the next section.

Figure 3. Annual change in revenues, 2019-2020 and 2020-2021

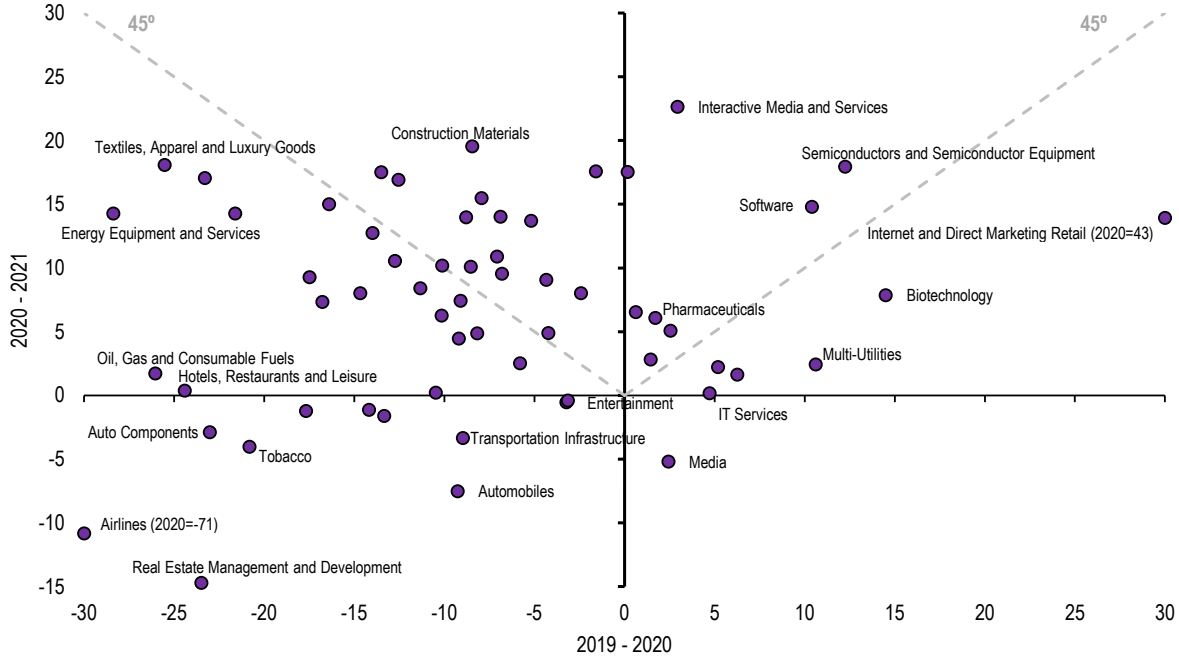
Sector aggregates, difference of logs



Note: China is excluded from the sample. Each circle corresponds to an industry defined at the 3-digit disaggregation level (CIQ3).
Source: Authors 'calculations based on the S&P Capital IQ database.

Figure 4. Annual change in capital expenditure, 2019-2020 and 2020-2021

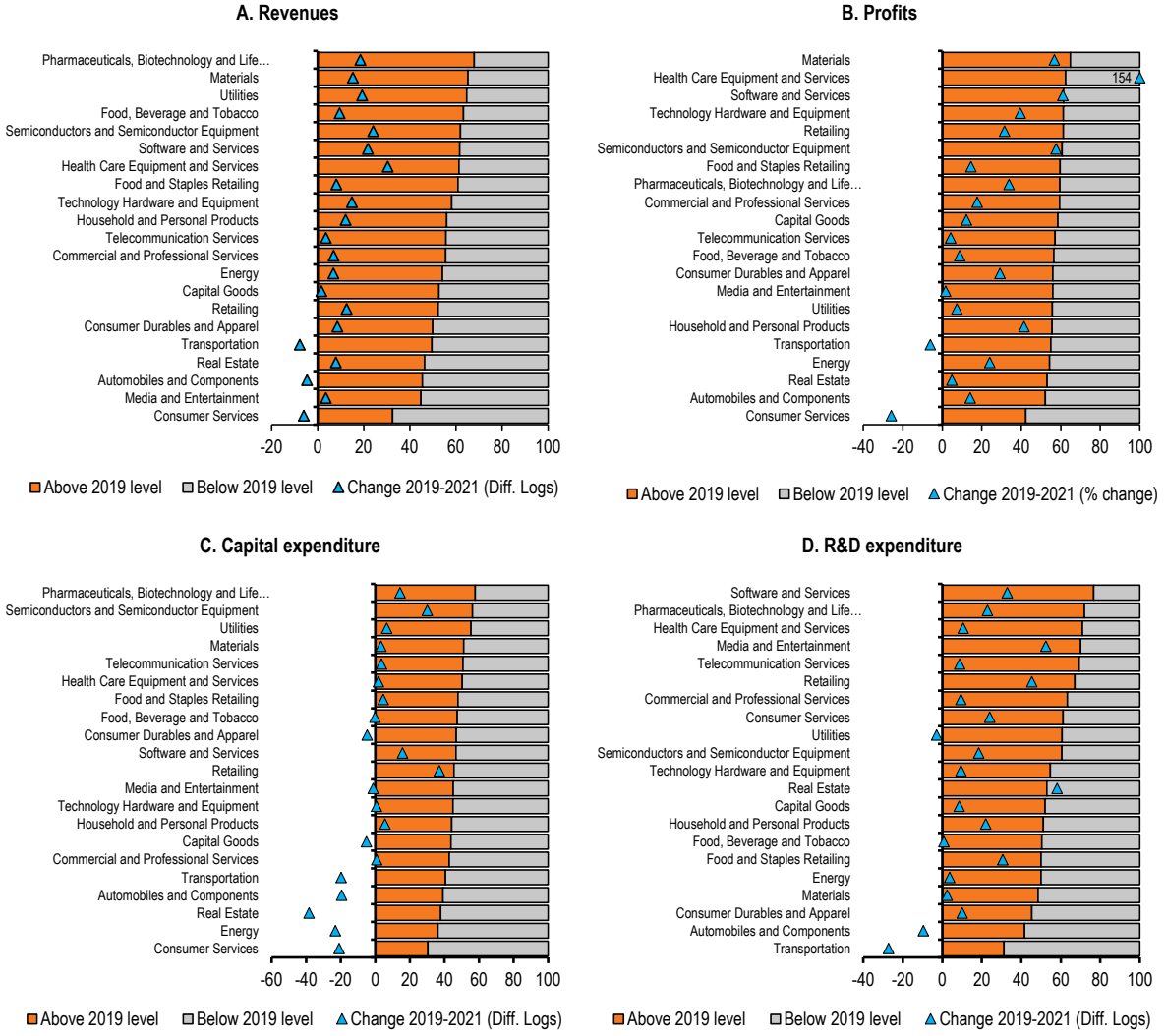
Sector aggregates, difference of logs



Note: China is excluded from the sample. Each circle corresponds to an industry defined at the 3-digit disaggregation level (CIQ3).
Source: Authors' calculations based on the S&P Capital IQ database.

Figure 5. Comparing selected firm variables in 2021 to their 2019 levels

Share of companies by sector, percentage



Note: China is excluded from the figure. Industries are defined at 2-digit level (CIQ2). Blue triangles correspond to sector aggregates.
Source: Authors' calculations based on the S&P Capital IQ database.

3. Empirical framework

19. We investigate formally the differential impact of the COVID-19 shock and the subsequent recovery on firms' performance and investment behaviour using the following difference-in-differences regression model:[9]

$$y_{i,c,s,t} = \beta_0 + \beta_1 FirmChar_{ics,2019} * \boldsymbol{Covid} + \beta_2 FirmChar_{ics,2019} * \boldsymbol{Recovery} + \beta_3 Controls_{ics,2019} * Covid + \beta_4 Controls_{ics,2019} * Recovery + d_i + d_{c,s,t} + e_{i,c,s,t} \quad (1)$$

where the subscripts *i, c, s, t* stand for firm, country, sector and time, respectively; the dependent variable *y* refers alternatively to the log of revenues when exploring the determinants of firm performance, and capex (or R&D investment) when investigating firms' investment behaviour; the vector $FirmChar$ captures the firm-level characteristics of interest (see below), all measured at the end of 2019, while the vector $Controls$ accounts for a set of additional firm-level characteristics in 2019 (see again below). *Covid* and *Recovery* are binary variables taking the value of 1 in 2020 (Covid-19 shock) and 2021 (the recovery), respectively. d_i is a vector of firm fixed-effects and $d_{c,s,t}$ a vector of country-sector-time effects. We use the CIQ3 definition to define sectors (61 altogether).

20. Firm characteristics of interest are related to firm *size*, measured by the log of total assets, firm *age*, computed by taking the difference between 2019 and the year the firm was founded, and firm *financial fragility*. The latter is captured by the firm's (i) debt burden, measured alternatively by its leverage ratio (debt to total assets ratio) or the inverse of its debt service burden (ICR); (ii) rollover risk, measured by the share of short-term debt to total debt; and (iii) liquidity position, measured by the ratio of short-term assets (cash and equivalent) to total assets. Instead of using raw ICR values, which present very large outliers, we rank the ICR of each firm in each sector and define a dummy variable taking value 1 if a firms falls in the bottom quartile of the distribution (where the debt service burden is highest) and 0 otherwise to identify firms that are financially constrained according to this metric.[10] Similarly, we define firms to be liquidity constrained if they belong to the bottom quartile of the sectoral cash-to-assets distribution and old if they are in the top quartile of the sectoral age distribution.

21. Additional controls include a dummy for listed companies and a measure of firms' inventories level (inventories to total assets ratio), which captures the ability to sell even in the presence of supply chain constraints. In line with the literature, we also include the log of revenues in capex and R&D expenditures regressions to control for the performance of the firm over the relevant year and better isolate the direct impact of financial fragility.[11] With the exception of inventories, all these firm characteristics are relatively standard in the literature (Barbiero et al. 2020; Demirgüç-Kunt et al. 2020, Igan et al. 2022) and have all been shown to affect the way firms perform, especially during downturns.

22. We estimate equation (1) by OLS, clustering standard errors at the firm level. By controlling for a wide range of factors, this specification allows us to isolate, to the best of our ability, the impact of pre-COVID firms' characteristics on firms' revenue and investment performance during the whole COVID-19 cycle. While the vector $d_{c,s,t}$ absorbs potential supply and demand shocks operating at the

[9] Our methodology closely follows Kalemli-Ozcan et al. (2022), and Doerr et al. (2023). The relatively short length of our panel does not allow to look at longer term trends, but the empirical framework outlined in this section still permits to reliably compare the relative performance of different groups of firms during the pandemic period, as for instance in Doerr et al. (2021).

[10] Prior to ranking, we exclude observations where EBITDA and ICR had different signs (i.e., where interest expenses were negative).

[11] Financial fragility can affect firms' revenues, which in turn affects investment. Including a measure of sales controls for that channel and allows us to isolate better the debt overhang channel. We use the log-level of revenues in panel regressions and the change in log revenues in cross-sectional regressions.

country-sector level (e.g., the retail sector in France during the pandemic), the firm fixed effects absorbs unobserved firm-specific heterogeneity. As a result, identification occurs by comparing the change (from before to after the shock, for each firm) in the outcome variable of interest across firms with different characteristics but in the same country-sector-year cell. The parameters of interest are therefore the coefficients β_1 and β_2. A positive and significant β_1 coefficient attached to *firm size,* for instance, would indicate that within a country-sector the change in revenues (or investment) from the pre-COVID-19 to the post-COVID-19 period was more positive (or less negative) for larger compared to smaller firms (e.g., in France, large retailers doing relatively better than smaller retailers). Similarly, a positive and significant β_2 coefficient would indicate that the larger firms rebounded more strongly than smaller ones. Such a framework is standard in the corporate finance literature and has been recently used by Kalemli-Ozcan et al. (2022) to investigate the role of financial factors behind the sluggish post-GFC performance of European firms.

23. To complement the above analysis and further relate our findings to previous estimates from the literature, we proceed in two ways. First, we check the robustness of our results also in a cross-sectional setting, where, for each period separately, the change in the firm-level outcome of interest (revenues, capex or R&D expenditure) is regressed against our set of explanatory variables (2019 levels of firms characteristics). Analytically:

$$\Delta y_{i,c,s} = \beta_0 + \beta_1 \, FirmChar_{i,c,s,19} + \beta_2 Controls_{i,c,s,19} + d_{c,s} + e_{i,c,s} \quad (2)$$

where notation is consistent with equation (1) and $\Delta y_{i,c,s,\mathrm{t}}$ refers to the (log) change in revenues (or capex or R&D expenditures) either in 2019-2020 or in 2020-21, while $d_{c,s}$ stands for a vector of country by sector fixed effects.

24. Second, we use a first differences regression framework to investigate whether firms that became more financially fragile during 2020 (i.e., took on more debt, increased the share of short-term debt or became less liquid) reduced more their capital or R&D spending in 2021. To do so, we run the following regression:

$$\Delta y_{i,c,s,21-20} = \beta_0 + \beta_1 \Delta fin\_frag_{i,c,s,20-19} + \beta_2 Controls_{i,c,s,19} + \beta_3 \Delta \log (rev)_{i,c,s,21-20} + d_{c,s} + e_{i,c,s} \quad (3)$$

where notation is again consistent with equations (1) and (2). More specifically, $\Delta y_{i,c,s,2021-2020}$ refers to the (log) change in capex (or R&D expenditures) in 2020-21 , $\Delta fin\_frag_{i,c,s,2020-2019}$ refers to the change in the characteristic of interest in 2019-2020 (e.g. leverage, liquidity or ICR) and $Controls_{i,c,s,2019}$ is a vector of firm-specific controls measured as of 2019 (e.g. firm size, age).

25. Finally, in keeping with section 2, all regressions are estimated without Chinese companies (Tables 2 to 4). However, our key results are robust to the inclusion of China in the sample (see Appendix, Table A.6 and A.7).

4. Key results

4.1. How did smaller or younger firms do?

26. Table 2 reports results for our baseline model, outlined in equation (1). For simplicity, even though all controls are included in the estimation, only the coefficients of interest (β_1 and β_2) attached to firm size and age are reported and analysed in this sub-section. Results are always reported for both alternative measures of debt burden (leverage ratio and ICR), with the actual variable used mentioned at the top of each column.

27. In general, we find that, if anything, larger firms performed worse than their smaller counterparts over the COVID cycle. After controlling for financial characteristics (explored below), we show that there is no evidence of a size premium in terms of revenue dynamics (Table 2, columns 1 and 2). Rather, in the ICR specification (Column 2), there is some evidence that larger firms have underperformed their peers, though the estimated impact of size is numerically small. A potential explanation for this finding is that relatively smaller firms tend to operate more locally, both in terms of input purchases and sales, thus being less exposed to the global value chain disruptions that severely impaired the operations of the largest multinationals following the COVID-19 outbreak, as well as to foreign demand shocks. In this vein, large exporters in France and Portugal have been found to be more affected by the lockdowns adopted during the pandemic (Amador *et al.*, 2021; Bricongne *et al.*, 2021) and the more so -- in France -- for firms that were also importers, potentially facing supply bottlenecks (Lebastard et al., 2023).

28. These findings are confirmed when: i) excluding all firm-level controls from the estimation, thus obtaining the "unconditional" role of size in determining revenue performance;[12] and ii) using alternative definitions for firm size, comparing the revenue dynamics of pre-COVID-19 industry leaders (defined as the top quartile or decile of the sectoral distribution of assets or as the largest 50 companies in each sector) to that of all other firms – see Table A.3, Panel A, in the Appendix. We also find that being in the top quartile of firm age is associated with a drop in revenues both during the pandemic and the recovery (Table 2, columns 1 and 2), further reinforcing the idea that well-established firms did not outperform their peers.

[12] This is particularly relevant in order to interpret our findings also from a market concentration perspective. Easier access to finance is one of the major features characterizing large firms' advantage and the baseline estimates in Table 2 alone would not have allowed to exclude the presence of an unconditional size premium – i.e. the possibility that, overall, larger firms have expanded more / contracted less during the COVID-19 crisis when their financial health advantage is not controlled for.

Table 2. The impact of firm size and age on performance

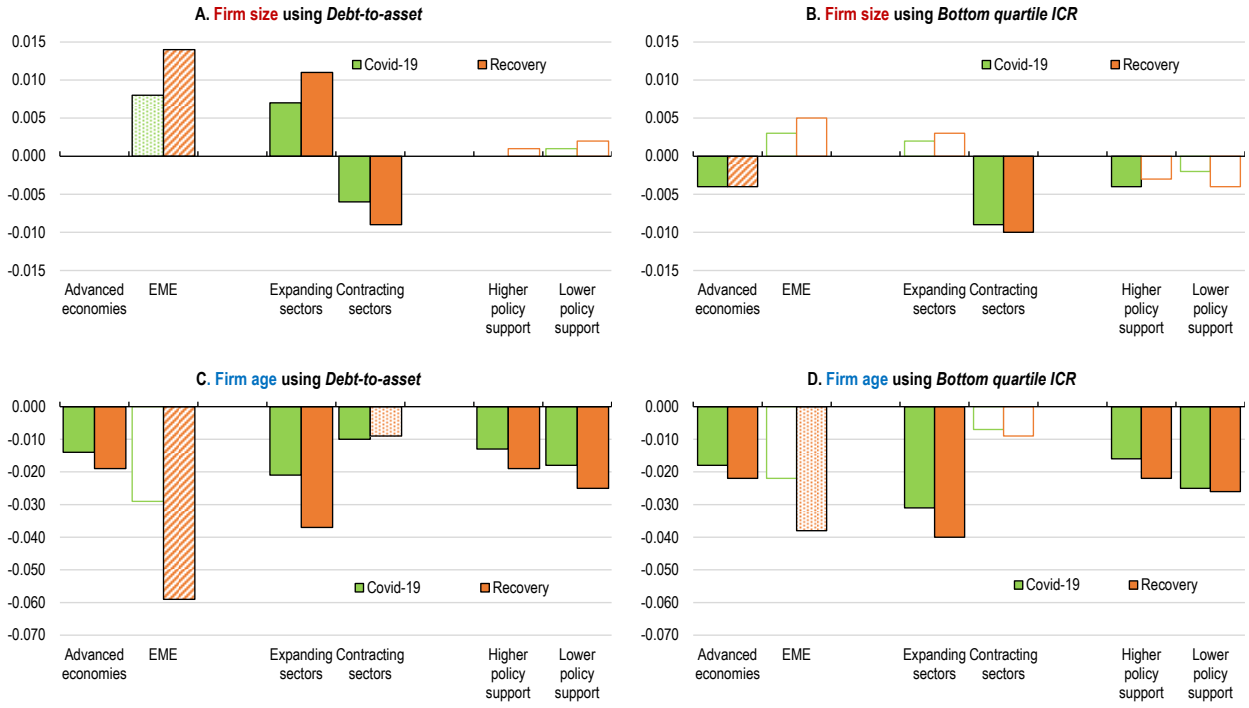
	(1)	(2)	(3)	(4)
Debt burden control variable:	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR
Dependent variable:	**ln(rev)**	**ln(rev)**	**ln(capex)**	**ln(capex)**
Yr 2020 x Firm size 2019	0.001	-0.003**	-0.003	-0.004
	(0.001)	(0.001)	(0.005)	(0.005)
Yr 2021 x Firm size 2019	0.002	-0.003*	-0.031***	-0.026***
	(0.001)	(0.002)	(0.005)	(0.006)
Yr 2020 x Firm age 2019	-0.015***	-0.019***	0.006	0.001
	(0.003)	(0.004)	(0.018)	(0.019)
Yr 2021 x Firm age 2019	-0.022***	-0.023***	-0.017	-0.012
	(0.004)	(0.005)	(0.021)	(0.022)
Observations	198,755	115,701	44,159	36,380
Number of firms	66,285	38,589	14,990	12,302
R-squared	0.981	0.987	0.955	0.958
Adjusted R-squared	0.971	0.979	0.921	0.926
Firm FE	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. China is excluded from the sample. Firm size is measured by the log of total assets. Firm age is a dummy variable equal to one for firms in the top quartile of the sectoral age distribution. Firm-level controls included but not shown in the table are those pertaining to financial fragility, inventories, listed vs unlisted companies and (for capex and R&D) revenues (see Section 3).
Source: Authors' calculations based on the S&P Capital IQ database.

29. Splitting the sample reveals further findings regarding revenue dynamics. First, the underperformance of larger firms is driven by advanced economies (Figure 6), where the rise in various measures of corporate power has been the strongest over the last 30 years (Akcigit et al, 2021).[13] Second, we find a major difference in firms dynamics between "expanding" and "contracting" industries, with the former defined as a country-industries that in our sample recorded positive aggregate revenue growth over the whole COVID pandemic (i.e., FY2021 compared to FY2019). In contracting industries, the underperformance of large firms increases in statistical significance compared to the full sample. In contrast, the effect of firm size in "expanding" sectors is either muted (Figure 6, Panel B) or positive and significant (Figure 6, Panel A). As regards firm age, the full-sample results hold with stronger statistical significance in advanced economies but, unlike for size, are mainly driven by expanding sectors (Figure 6, Panels C and D).

[13] Akcigit et al. (2021) show that global markups and industry concentration metrics have increased by around 30 per cent, on average, since 1980 and that this increase is concentrated among advanced economies. In contrast, all measures of market power have remained mostly constant in emerging markets. Admittedly, the relatively small size of our subsample for emerging markets weighs on the robustness of the results for those economies.

Figure 6. Effect of firm size and age on revenues in subsamples



Note: China is excluded from the sample. Each bar corresponds to the coefficients associated to the log of assets in 2019 and the dummy variable of age in 2019 from the estimation of equation (1). Industries are defined at the 3-digit level (CIQ3). Higher and lower policy support are defined based on total fiscal support excluding contingent liabilities. Empty bars indicate non-significant coefficients, dotted bars indicate significance at 90%, dashed bars indicate significance at 95%, and filled bars indicate significance at 99%.
Source: Authors' calculations based on IMF (2021) and S&P Capital IQ database.

30. This finding suggests that relatively smaller firms might have gained market share within contracting sectors at the expense of larger ones. In contrast, in some expanding sectors larger firms might have profited from the pandemic to cement their position of leaders. However, we have generally not found this to be the case in sectors that were already under scrutiny from a competition perspective before the COVID pandemic, such as health care and technology (Akcigit et al, 2021; Appendix, Table A.4).[14] This result is confirmed using sector-specific regressions: with a few exceptions, we find that the coefficients attached to firm size in technology- or health care-related sectors, during either the pandemic or the recovery, are either insignificant or negative (Appendix, Figure A.6).

31. Policy support mainly targeted at smaller firms, as was the case with many measures, could help explain their comparative resilience. To shed some light on this issue, we have considered subsamples of higher versus lower fiscal policy support, with countries ranked by decreasing order of support in percent of GDP and successively added to the higher support group until it reached half of the firms in the sample.[15] With fiscal support defined as the sum of above and below the line measures except contingent liabilities (IMF, 2021), differences between the two subsamples are limited, with a comparatively better performance of smaller firms in higher-support countries only in 2020 and in the ICR-based specification (Figure 6,

[14] We run equation (1) on two sub-samples, firms operating in tech and health care-related sectors and others. The list of sub-sectors included in that definition is reported in Appendix. This result is robust to alternative definitions.

[15] The alternative of considering countries with above versus below-median support would lead to very unbalanced subsamples, with the vast majority of the observations in the former.

Panel B).[16] Broadly similar results have been obtained for both narrower and broader definitions of policy support (just above-the-line measures and total support including contingent liabilities, respectively – Appendix, Figure A.7). Overall, policy support does not seem to have been the key driver of the better relative revenue performance of smaller firms, though it may have helped it. It is also unclear whether in our sample policy support tended to decrease with firm size, since small and very small firms are under-represented.

32. Larger firms also invested significantly less than smaller ones during the recovery (Table 2, Columns 3 & 4).[17] This result is robust across country groups (AEs vs EMEs) and holds for both expanding and contracting industries as well as when not controlling for firms financial status or using different proxies for firms' size (Appendix, Table A.3, Panel B). It also holds in both higher and lower policy support subsamples.[18] Finally, sector-specific regressions show that (i) larger firms operating in technology and healthcare sectors did not invest more in 2020 comparatively to smaller firms and (ii) they invested significantly *less* in 2021, for instance in health care-related industries (Appendix, Figure A.8).

33. The higher resilience and better investment performance of relatively smaller or younger firms could also be related to the selection bias that affects most firm-level studies. Our analysis focuses on continuing firms (those with data for all three years, 2019 to 2021), which tend to overperform compared to exiting ones: as smaller and younger firms are more likely to exit the market (Crane et al., 2022), the selection bias may be more pronounced for them and drive our findings (continuing small firms would tend to be those performing best, to a larger extent than continuing large firms). At the same time, we do not account for firm entry either, and the bulk of entrants is constituted by smaller firms with strong growth prospects. While we could not explicitly account for firm entry and exit in our analysis,[19] recent research shows that exit rates have been particularly low during the pandemic period and entry rebounded quite strongly a few months after the COVID-19 outbreak (OECD, 2021; Verlhac et al., 2022). As a result, the potential bias may affect the estimates in both directions – i.e., not accounting for exit (entry) would lead to an overestimation (underestimation) of the relative performance of smaller firms – and its magnitude is thus expected to be small.

[16] To our knowledge, there is no comparable cross-country data on the actual take-up of contingent liability forms of support, such as guarantees. We could not find data on the allocation of support to firms by size classes, either. Thus, overall, the stylised nature of our policy support variable does not allow us to compare how national variations in the composition and targeting of policy responses could affect the outcomes of interest.

[17] We do not report results for R&D expenditures as these are mostly available for large firms, implying a lack of variation in firm size compared to capex regressions.

[18] Monetary policy could also potentially explain differences in investment between smaller and larger firms, but its impact is not unambiguous. On the one hand, smaller and younger firms tend to be on average more financially constrained and thus more sensitive to aggregate financing conditions with respect to their ability to obtain external financing (Durante et al., 2020). Consequently, the further monetary policy easing that followed the Covid-19 outbreak could also contribute to explain their relatively better investment performance. On the other hand, large firms may have benefited more from monetary and liquidity easing, for example through bond issuances at very low interest rates. In both instances, the relevance of these potential channels in driving our findings should in any case be small, given that the monetary policy stance was accommodative already in 2019 and that we use a difference-in-differences estimation strategy.

[19] Indeed, our data do not necessarily capture firms' actual entry in or exit from the market, but rather their inclusion in or exclusion from the dataset – discrepancies may easily arise between these two processes, for instance due to delayed reporting and non-universal coverage of the data.

34. Taken together, these results have important implications. When the pandemic hit, some studies predicted that it could hurt smaller enterprises harder, particularly in the most affected industries, potentially leading to increases in industry concentration and market power (Akcigit et al, 2021). This effect could happen either though the exit of smaller firms, a reallocation of sales away from smaller firms towards industry leaders or, over a longer horizon, through an investment gap between leaders and followers.[20] Overall, we find little evidence that the pandemic induced a large and systematic reallocation of sales towards industry leaders, including in sectors that were already under scrutiny from a competition standpoint. In fact, the opposite happened in many sectors, both at the height of the COVID-19 pandemic and during the recovery. Similarly, we do not find evidence of an investment gap. If anything, relatively younger and smaller firms invested relatively more in almost all sectors when investment rebounded globally during the recovery.

4.2. How did financially fragile firms do?

35. We now turn to the impact of financial fragility on firm performance. Mirroring the discussion above, Table 3 reports only the coefficients of interest even though all regressions include controls for firm size, age and other relevant characteristics. We highlight three important findings.

36. First, firms that entered the crisis with a higher debt-assets ratio did significantly worse in terms of revenues, both during the pandemic and the recovery. A similar result emerges when using the ICR as a proxy for the debt burden, with low ICR firms being associated with a worse performance in both years. A higher share of short-term debt ex-ante is also associated with lower revenues, especially in the recovery period. Similarly, firms with a low share of liquid assets have tended to grow less or contract more than more liquid companies. These results are broadly robust across country groups defined in terms of development levels (AEs vs EMEs) and across contracting and expanding sectors (Figure 7). Likewise, results mostly hold for both higher and lower policy support subsamples, though, unsurprisingly, statistical significance and coefficient size tend to be larger in the latter.[21] We also emphasize that those results are not driven by the presence of listed firms in our sample, since all regressions include an interaction between the listed dummy variable and the Covid and Recovery dummies. Overall, these results support the intuition that *ex-ante* financial health enhances resilience and leads to relatively better results during a crisis.

37. Second, the liquidity position of firms upon entering the crisis significantly impacted investment spending dynamics. For capex, we estimate that being in the bottom quartile of the cash-to-assets distribution is associated with a significant decrease in investment spending both during the pandemic and the recovery[22]. The effect of poor liquidity on R&D spending is also negative but only significant during the pandemic and in the specification with the ICR-based measure of debt burden.

38. Third, we find some evidence of debt overhang. Higher ex-ante leverage reduced investment spending, including on R&D, but other financial fragility metrics, such as the ICR or a higher share of short-term debt, have in general not been found to affect firms' capital expenditures (Table 3). Moreover, and interestingly, we find that firms that became more fragile during the pandemic by increasing their debt-to-assets ratio (or seeing their ICR fall) reduced more their capital spending during the recovery (Equation (3) and Table 4).

[20] The pandemic-driven shift to online activities, for instance, could have benefitted the large technology companies, which could further strengthen market concentration in their respective industries.

[21] Similar remarks apply to alternative definitions of policy support (Appendix, Figure A.9).

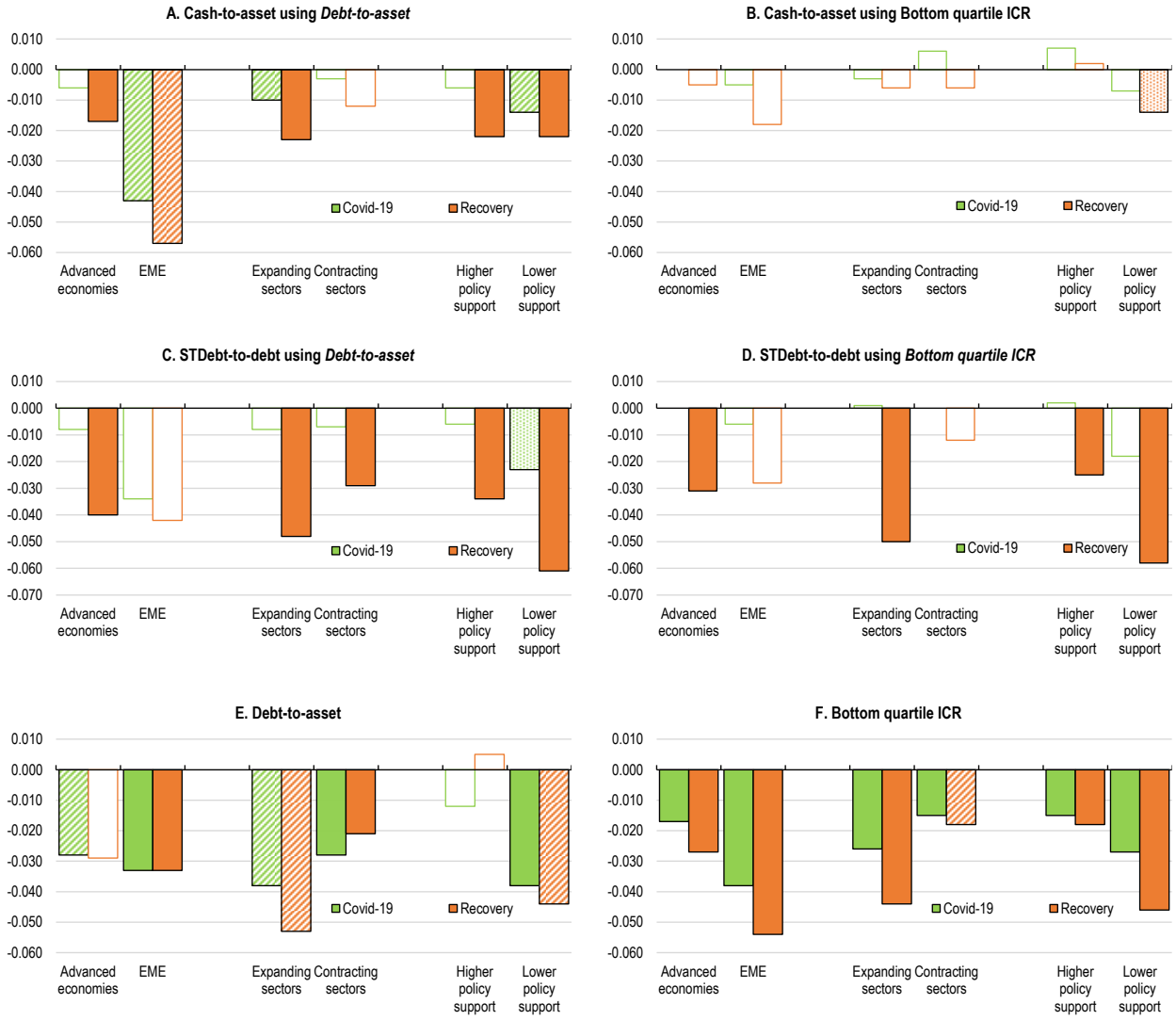
[22] The acceleration in inflation in the course of 2021 may have provided a stimulus to invest available liquidity. However, we do not regard this factor as the main driver of our findings, since they also hold for 2020, when inflation was very low. In addition, in many countries it was only well into 2021 that inflation accelerated beyond 2019 levels and that such acceleration became increasingly regarded as likely to be persistent.

Table 3. The impact of firm financial characteristics on performance

Debt burden control variable:	(1) Debt-to-Assets	(2) Bottom Quartile ICR	(3) Debt-to-Assets	(4) Bottom Quartile ICR	(5) Debt-to-Assets	(6) Bottom Quartile ICR
Dependent variable:	**ln(rev)**	**ln(rev)**	**ln(capex)**	**ln(capex)**	**ln(rd)**	**ln(rd)**
Yr 2020 x Cash-to-assets 2019	-0.009**	-0.001	-0.059***	-0.080***	-0.066	-0.115**
	(0.004)	(0.005)	(0.022)	(0.024)	(0.041)	(0.046)
Yr 2021 x Cash-to-assets 2019	-0.021***	-0.008	-0.046*	-0.062**	-0.075	-0.085
	(0.005)	(0.006)	(0.026)	(0.027)	(0.056)	(0.061)
Yr 2020 x STDebt-to-debt 2019	-0.010**	-0.001	0.031	0.044	-0.011	0.000
	(0.005)	(0.007)	(0.033)	(0.036)	(0.046)	(0.047)
Yr 2021 x STDebt-to-debt 2019	-0.041***	-0.031***	-0.009	0.022	-0.128**	-0.069
	(0.006)	(0.008)	(0.038)	(0.040)	(0.055)	(0.056)
Yr 2020 x Debt-to-assets 2019	-0.031***		-0.129***		-0.103*	
	(0.007)		(0.042)		(0.056)	
Yr 2021 x Debt-to-assets 2019	-0.032**		-0.192***		-0.159**	
	(0.013)		(0.045)		(0.073)	
Yr 2020 x ICR 2019		-0.020***		-0.033		-0.026
		(0.004)		(0.023)		(0.036)
Yr 2021 x ICR 2019		-0.030***		-0.019		-0.037
		(0.006)		(0.027)		(0.047)
Observations	198,755	115,701	44,159	36,380	9,467	7,553
Number of firms	66,285	38,589	14,990	12,302	3,202	2,549
R-squared	0.981	0.987	0.955	0.958	0.979	0.982
Adjusted R-squared	0.971	0.979	0.921	0.926	0.964	0.968
Firm FE	YES	YES	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. China is excluded from the sample. Cash-to-assets is a dummy variable equal to one for firms in the bottom quartile of the sectoral cash-to-assets distribution. ICR is a dummy variable equal to one for firms in the bottom quartile of the sectoral ICR distribution. The regressions reported in this table are the same as those in Table 2: firm-level controls included but not shown in the table are those pertaining to firm size and age, inventories, listed vs unlisted companies and (for capex and R&D) revenues (see Section 3).
Source: Authors' calculations based on the S&P Capital IQ database.

Figure 7. Effect of firm financial characteristics on revenues in subsamples



Note: China is excluded from the sample. Each bar corresponds to the coefficients associated to each variable from the estimation of equation (1). Industries are defined at the 3-digit level (CIQ3). Cash-to-assets is a dummy variable equal to one for firms in the bottom quartile of the sectoral cash-to-assets distribution. ICR is a dummy variable equal to one for firms in the bottom quartile of the sectoral ICR distribution. Higher and lower policy support are defined based on total fiscal support excluding contingent liabilities. Empty bars indicate non-significant coefficients, dotted bars indicate significance at 90%, dashed bars indicate significance at 95%, and filled bars indicate significance at 99%.
Source: Authors' calculations based on IMF (2021) and S&P Capital IQ database.

Table 4. The impact of the 2019-2020 change in firm financial characteristics on performance

First-differences regressions

	(1)	(2)	(3)	(4)
Debt burden control variable:	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR
Dependent variable:	**Capex Log change 20-21**	**Capex Log change 20-21**	**R&D Log change 20-21**	**R&D Log change 20-21**
Cash-to-assets change 19-20	-0.195***	-0.185***	0.027	0.045
	(0.021)	(0.023)	(0.029)	(0.034)
Debt-to-assets change 19-20	-0.299**		-0.196**	
	(0.147)		(0.093)	
ICR change 19-20		-0.104***		-0.056
		(0.024)		(0.035)
Observations	14,387	10,872	3,147	2,325
R-squared	0.138	0.155	0.105	0.109
Country-Sector FE	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. The table shows the selected coefficient estimates from equation (3). China is excluded from the sample. Firm-level controls included but not shown in the table are those pertaining to size, age, short-term debt, inventories, listed vs unlisted companies and revenues (see Section 3). Consistent with previous estimations, we define the changes in liquidity and in the interest coverage ratio as categorical variables: more specifically, firms are considered to have experienced a sharp decline in liquidity (interest coverage) if they belong to the bottom quartile of the sectoral distribution of the 2019-2020 change in the Cash-to-assets ratio (ICR).
Source: Authors' calculations based on the S&P Capital IQ database.

39. Finally, we replicate all baseline estimations also in the cross-sectional setting outlined in equation (2), thus separately evaluating the role that pre-pandemic firms' characteristics have played in shaping revenues and investment dynamics during the COVID-19 peak and the recovery phase. As shown in Table A.5 in Appendix, results are qualitatively unchanged. There remains some evidence of a better comparative performance of smaller firms, particularly as regards sales in 2020 (when the debt burden is controlled for on the basis of the ICR) and investment in 2021. Both in the pandemic and the subsequent recovery, sales tend to be negatively affected by ex-ante financial fragility. Finally, a weaker liquidity position or higher indebtedness in 2019 are again associated to lower capex and R&D spending, though only in 2020.

5. Conclusions

40. Using data on more than 150.000 non-financial companies operating in both manufacturing and services sectors around the world, this paper has analysed the drivers of firm performance throughout the COVID-19 cycle. Overall, we find that that larger and older firms have tended to do worse than smaller and younger ones in terms of revenues and investment spending, both during COVID-19 and the subsequent recovery. Even in sectors that were under scrutiny from a competition standpoint, such as technology and healthcare, larger firms did not systematically over-perform. The absence of a "size' premium suggests that, at least until now, the COVID-19 pandemic did not induce a systematic reallocation of market shares towards industry leaders, which would have led to a broad-based increase in concentration. While a systematic analysis of the drivers of the relative resilience of smaller firms is beyond the scope of this paper, the abundant policy support provided during the pandemic crisis seems, at best, a partial explanation.

41. At the same time, we found that ex-ante financial strength clearly improved firm performance in terms of revenues during the COVID-19 cycle. Different indicators of better financial health in 2019 were also found to be associated to comparatively more investment, including in R&D, over the pandemic crisis. For instance, lower liquidity seems to have weighed on investment dynamics, and firms that entered the crisis with a higher leverage ratio invested less than others both in 2020 and in 2021 (debt overhang). In addition, firms which became more financially fragile during the pandemic tended to record weaker investment spending during the recovery. These insights suggest that global investment spending has already suffered from the general rise in indebtedness in the corporate sector and that the global tightening cycle at play could magnify these trends going forward.

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Annex A. Appendix

Table A A.1. Countries in the sample

Advanced economies			Emerging markets		
Country	Frequency	Share (%)	Country	Frequency	Share (%)
Australia	596	0.4	Argentina	1	0.0
Austria	1,879	1.2	Brazil	840	0.5
Belgium	6,173	3.9	Chile	232	0.2
Canada	581	0.4	China	8,540	5.4
Czech Republic	24	0.0	Colombia	57	0.0
Denmark	1,703	1.1	Croatia	53	0.0
Estonia	16	0.0	India	2,152	1.4
Finland	1,476	0.9	Indonesia	515	0.3
France	19,155	12.1	Malaysia	1	0.0
Germany	3,204	2.0	Mexico	125	0.1
Greece	130	0.1	Peru	103	0.1
Hong Kong (China)	1,122	0.7	Philippines	152	0.1
Hungary	17	0.0	Russia	216	0.1
Iceland	20	0.0	Saudi Arabia	158	0.1
Ireland	1,686	1.1	Thailand	667	0.4
Italy	24,484	15.5	Türkiye	244	0.2
Japan	29,319	18.5			
Latvia	7	0.0			
Lithuania	22	0.0			
Luxembourg	98	0.1			
Netherlands	2,436	1.5			
New Zealand	269	0.2			
Norway	5,342	3.4			
Poland	286	0.2			
Portugal	3,355	2.1			
Singapore	398	0.3			
Slovak Republic	11	0.0			
Slovenia	16	0.0			
Korea	2,818	1.8			
Spain	7,353	4.6			
Sweden	6,753	4.3			
Switzerland	259	0.2			
United Kingdom	20,440	12.9			
United States	2,879	1.8			
Total	**144,327**	**91.1**	**Total**	**14,056**	**8.9**

Source: Authors' calculations based on the S&P Capital IQ database.

Table A A.2. Industries in the sample

CIQ2	CIQ	Frequency	Share (%)
1. Automobiles and Components			
	1. Auto Components	2,203	1.39
	2. Automobiles	411	0.26
	Total	**2,614**	**1.65**
2. Capital Goods			
	3. Aerospace and Defense	672	0.42
	4. Building Products	1,486	0.94
	5. Construction and Engineering	12,485	7.88
	6. Electrical Equipment	2,132	1.35
	7. Industrial Conglomerates	246	0.16
	8. Machinery	7,462	4.71
	9. Trading Companies and Distributors	12,250	7.73
	Total	**36,733**	**23.19**
3. Commercial and Professional Services			
	10. Commercial Services and Supplies	7,845	4.95
	11. Professional Services	3,681	2.32
	Total	**11,526**	**7.28**
4. Consumer Durables and Apparel			
	12. Household Durables	3,992	2.52
	13. Leisure Products	393	0.25
	14. Textiles, Apparel and Luxury Goods	2,996	1.89
	Total	**7,381**	**4.66**
5. Consumer Services			
	15. Diversified Consumer Services	1,514	0.96
	16. Hotels, Restaurants and Leisure	4,222	2.67
	Total	**5,736**	**3.62**
6. Energy			
	17. Energy Equipment and Services	545	0.34
	18. Oil, Gas and Consumable Fuels	2,535	1.6
	Total	**3,080**	**1.94**
7. Food and Staples Retailing			
	19. Food and Staples Retailing	7,018	4.43
	Total	**7,018**	**4.43**
8. Food, Beverage and Tobacco			
	20. Beverages	889	0.56
	21. Food Products	7,102	4.48
	22. Tobacco	72	0.05
	Total	**8,063**	**5.09**
9. Health Care Equipment and Services			
	23. Health Care Equipment and Supplies	1,206	0.76
	24. Health Care Providers and Services	5,123	3.23
	25. Health Care Technology	160	0.1
	Total	**6,489**	**4.1**
10. Household and Personal Products			
	26. Household Products	317	0.2
	27. Personal Products	593	0.37
	Total	**910**	**0.57**
11. Materials			
	28. Chemicals	5,524	3.49
	29. Construction Materials	1,843	1.16
	30. Containers and Packaging	1,562	0.99
	31. Metals and Mining	5,870	3.71
	32. Paper and Forest Products	1,466	0.93
	Total	**16,265**	**10.27**

CIQ2	CIQ3	Frequency	Share (%)
12. Media and Entertainment			
	33. Entertainment	1,320	0.83
	34. Interactive Media and Services	305	0.19
	35. Media	2,996	1.89
	Total	**4,621**	**2.92**
13. Pharmaceuticals, Biotechnology and Life Sciences			
	36.Biotechnology	403	0.25
	37. Life Sciences Tools and Services	271	0.17
	38. Pharmaceuticals	1,606	1.01
	Total	**2,280**	**1.44**
14. Real Estate			
	39. Real Estate Management and Development	6,476	4.09
	Total	**6,476**	**4.09**
15. Retailing			
	40. Distributors	6,200	3.91
	41. Internet and Direct Marketing Retail	816	0.52
	42. Multiline Retail	460	0.29
	43. Specialty Retail	8,760	5.53
	Total	**16,236**	**10.25**
16. Semiconductors and Semiconductor Equipment			
	44. Semiconductors and Semiconductor Equipment	685	0.43
	Total	**685**	**0.43**
17. Software and Services			
	45. IT Services	3,959	2.5
	46. Software	1,767	1.12
	Total	**5,726**	**3.62**
18. Technology Hardware and Equipment			
	47. Communications Equipment	569	0.36
	48. Electronic Equipment, Instruments and Components	3,511	2.22
	49. Technology Hardware, Storage and Peripherals	423	0.27
	Total	**4,503**	**2.84**
19. Telecommunication Services			
	50. Diversified Telecommunication Services	654	0.41
	51. Wireless Telecommunication Services	153	0.1
	Total	**807**	**0.51**
20. Transportation			
	52. Air Freight and Logistics	1,378	0.87
	53. Airlines	257	0.16
	54. Marine	814	0.51
	55. Road and Rail	3,868	2.44
	56. Transportation Infrastructure	1,025	0.65
	Total	**7,342**	**4.64**
21. Utilities			
	57. Electric Utilities	1,744	1.1
	58. Gas Utilities	441	0.28
	59. Independent Power and Renewable Electricity Producers	902	0.57
	60. Multi-Utilities	164	0.1
	61. Water Utilities	641	0.4
	Total	**3,892**	**2.46**

Note: Sectors highlighted in yellow correspond to the tech and health care-related sectors.
Source: Authors' calculations based on the S&P Capital IQ database.

Table A A.3. The impact of size on performance (baseline model)

Dependent variable: ln(Revenue)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control variables:	NO	NO	YES	YES	NO	YES	YES	NO	YES	YES
Debt burden control variable:	--	--	Debt-to Assets	Bottom Quartile ICR	--	Debt-to Assets	Bottom Quartile ICR	--	Debt-to Assets	Bottom Quartile ICR
Yr 2020 x Ln(Assets 2019)	-0.000									
	(0.001)									
Yr 2021 x Ln(Assets 2019)	0.001									
	(0.001)									
Yr 2020 x Top quartile assets 2019		0.003	0.005	-0.007						
		(0.004)	(0.004)	(0.005)						
Yr 2021 x Top quartile assets 2019		0.007	0.008*	-0.004						
		(0.005)	(0.005)	(0.006)						
Yr 2020 x Top decile assets 2019					-0.009*	-0.007	-0.014**			
					(0.005)	(0.005)	(0.006)			
Yr 2021 x Top decile assets 2019					-0.007	-0.009	-0.013*			
					(0.006)	(0.007)	(0.007)			
Yr 2020 x Top 50 assets 2019								-0.040***	-0.037***	-0.028***
								(0.010)	(0.011)	(0.010)
Yr 2021 x Top 50 assets 2019								-0.024**	-0.027**	-0.018
								(0.012)	(0.012)	(0.013)
Observations	198,755	198,755	198,755	115,701	198,755	198,755	115,701	198,755	198,755	115,701
Number of firms	66,285	66,285	66,285	38,589	66,285	66,285	38,589	66,285	66,285	38,589
R-squared	0.981	0.981	0.981	0.987	0.981	0.981	0.987	0.981	0.981	0.987
Adjusted R-squared	0.971	0.971	0.971	0.979	0.971	0.971	0.979	0.971	0.971	0.979
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Dependent variable: ln(Capex)

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Control variables:	NO	NO	YES	YES	NO	YES	YES	NO	YES	YES
Debt burden control variable:	--	--	Debt-to Assets	Bottom Quartile ICR	--	Debt-to Assets	Bottom Quartile ICR	--	Debt-to Assets	Bottom Quartile ICR
Yr 2020 x Ln(Assets 2019)	-0.005									
	(0.004)									
Yr 2021 x Ln(Assets 2019)	-0.036***									
	(0.005)									
Yr 2020 x Top quartile assets 2019		-0.013	-0.014	-0.009						
		(0.022)	(0.022)	(0.025)						
Yr 2021 x Top quartile assets 2019		-0.083***	-0.076***	-0.060**						
		(0.025)	(0.025)	(0.028)						
Yr 2020 x Top decile assets 2019					-0.030*	-0.022	-0.028			
					(0.017)	(0.018)	(0.019)			
Yr 2021 x Top decile assets 2019					-0.108***	-0.091***	-0.073***			
					(0.020)	(0.020)	(0.022)			
Yr 2020 x Top 50 assets 2019								-0.012	0.010	0.000
								(0.018)	(0.018)	(0.019)
Yr 2021 x Top 50 assets 2019								-0.094***	-0.058***	-0.051**
								(0.022)	(0.022)	(0.023)
Observations	44,160	44,160	44,159	36,380	44,160	44,159	36,380	44,160	44,159	36,380
Number of firms	14,990	14,990	14,990	12,302	14,990	14,990	12,302	14,990	14,990	12,302
R-squared	0.953	0.953	0.955	0.958	0.953	0.955	0.958	0.953	0.955	0.958
Adjusted R-squared	0.918	0.918	0.921	0.926	0.918	0.921	0.926	0.918	0.921	0.926
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. China is excluded from the sample. Top quartile assets, top decile assets and top 50 assets are dummy variables equal to one for firms in these groups of the (sector-specific) asset distribution. In the specifications labelled "With Controls", the variables included but not shown in the table are those pertaining to financial fragility, inventories, listed vs unlisted companies and (for capex and R&D) revenues (see Section 3).
Source: Authors' calculations based on the S&P Capital IQ database.

Table A A.4. The impact of size and age on performance in tech and health care-related sectors vs others (baseline model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sectors:	TECH sectors	TECH sectors	Other sectors	Other sectors	TECH sectors	TECH sectors	Other sectors	Other sectors
Debt burden control variable:	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR
Dependent variable:	**ln(rev)**	**ln(rev)**	**ln(rev)**	**ln(rev)**	**ln(capex)**	**ln(capex)**	**ln(capex)**	**ln(capex)**
Yr 2020 x Firm size 2019	0.003	0.003	0.000	-0.004***	0.001	-0.005	-0.004	-0.004
	(0.004)	(0.003)	(0.001)	(0.001)	(0.011)	(0.013)	(0.005)	(0.006)
Yr 2021 x Firm size 2019	0.003	0.002	0.001	-0.003*	-0.025**	-0.018	-0.033***	-0.027***
	(0.004)	(0.004)	(0.001)	(0.002)	(0.012)	(0.015)	(0.006)	(0.006)
Yr 2020 x Firm age 2019	-0.030***	-0.035**	-0.013***	-0.017***	0.009	-0.009	0.004	0.002
	(0.009)	(0.015)	(0.003)	(0.004)	(0.043)	(0.047)	(0.020)	(0.021)
Yr 2021 x Firm age 2019	-0.054***	-0.057***	-0.017***	-0.020***	-0.006	-0.065	-0.018	-0.002
	(0.011)	(0.016)	(0.004)	(0.005)	(0.052)	(0.057)	(0.023)	(0.024)
Observations	22,030	11,778	176,725	103,923	8,013	5,917	36,146	30,463
Number of firms	7,346	3,928	58,939	34,661	2,721	1,998	12,269	10,304
R-squared	0.983	0.986	0.981	0.987	0.941	0.944	0.957	0.960
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. China is excluded from the sample. Firm size is measured by the log of total assets. Firm age is a dummy variable equal to one for firms in the top quartile of the sectoral age distribution. Firm-level controls included but not shown in the table are those pertaining to financial fragility, inventories, listed vs unlisted companies and (for capex) revenues (see Section 3). Tech sectors are those highlighted in Table A.2.
Source: Authors' calculations based on the S&P Capital IQ database.

Table A A.5. The impact of firm characteristics on performance

Cross-section regressions

Debt burden control variable:	(1) Debt-to-Assets	(2) Bottom Quartile ICR	(3) Debt-to-Assets	(4) Bottom Quartile ICR	(5) Debt-to-Assets	(6) Bottom Quartile ICR
Dependent variable:	**Revenue**	**Revenue**	**Capex**	**Capex**	**R&D**	**R&D**
	Log change 19-20	**Log change 19-20**	**Log change 19-20**	**Log change 19-20**	**Log change 19-20**	**Log change 19-20**
Firm size 2019	0.001	-0.003**	-0.003	-0.005	-0.004	-0.008
	(0.001)	(0.001)	(0.005)	(0.005)	(0.007)	(0.007)
Firm age 2019	-0.015***	-0.019***	-0.000	-0.004	-0.032	-0.025
	(0.003)	(0.004)	(0.018)	(0.019)	(0.028)	(0.032)
Cash-to-assets 2019	-0.009**	-0.001	-0.061***	-0.076***	-0.065	-0.111**
	(0.004)	(0.005)	(0.022)	(0.024)	(0.041)	(0.045)
STDebt-to-debt 2019	-0.009*	-0.001	0.033	0.050	-0.003	0.004
	(0.005)	(0.007)	(0.033)	(0.036)	(0.044)	(0.045)
Debt-to-assets 2019	-0.025***		-0.131***		-0.105*	
	(0.005)		(0.042)		(0.055)	
ICR 2019=1		-0.020***		-0.034		-0.019
		(0.004)		(0.023)		(0.035)
Observations	66,274	38,586	14,544	12,033	3,106	2,485
R-squared	0.148	0.173	0.143	0.155	0.102	0.102
Country-Sector FE	YES	YES	YES	YES	YES	YES

Debt burden control variable:	(7) Debt-to-Assets	(8) Bottom Quartile ICR	(9) Debt-to-Assets	(10) Bottom Quartile ICR	(11) Debt-to-Assets	(12) Bottom Quartile ICR
Dependent variable:	**Revenue**	**Revenue**	**Capex**	**Capex**	**R&D**	**R&D**
	Log change 20-21	**Log change 20-21**	**Log change 20-21**	**Log change 20-21**	**Log change 20-21**	**Log change 20-21**
Firm size 2019	0.001	0.001	-0.025***	-0.020***	0.010	0.012*
	(0.001)	(0.001)	(0.005)	(0.005)	(0.007)	(0.007)
Firm age 2019	-0.006**	-0.005	-0.031*	-0.018	-0.072**	-0.066**
	(0.003)	(0.004)	(0.018)	(0.020)	(0.028)	(0.031)
Cash-to-assets 2019	-0.012***	-0.007	0.005	0.017	-0.006	0.034
	(0.004)	(0.005)	(0.022)	(0.023)	(0.045)	(0.053)
STDebt-to-debt 2019	-0.031***	-0.031***	-0.038	-0.023	-0.108**	-0.060
	(0.005)	(0.006)	(0.034)	(0.036)	(0.046)	(0.049)
Debt-to-assets 2019	0.005		-0.069		-0.052	
	(0.004)		(0.043)		(0.054)	
ICR 2019=1		-0.011**		0.014		-0.008
		(0.004)		(0.024)		(0.039)
Observations	66,186	38,524	14,399	11,912	3,147	2,512
R-squared	0.115	0.149	0.129	0.14	0.104	0.103
Country-Sector FE	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. China is excluded from the sample. Firm size is measured by the log of total assets. Firm age is a dummy variable equal to one for firms in the top quartile of the sectoral age distribution. Cash-to-asset is a dummy variable equal to one for firms in the bottom quartile of the sectoral cash-to-asset distribution. ICR is a dummy variable equal to one for firms in the bottom quartile of the sectoral ICR distribution. Firm-level controls included but not shown in the table are those pertaining to inventories, listed vs unlisted companies and (for capex and R&D) revenues (see Section 3).
Source: Authors' calculations based on the S&P Capital IQ database.

Table A A.6. The impact of firm characteristics on performance, including China

Baseline model

	(1)	(2)	(3)	(4)	(5)	(6)
Debt burden control variable:	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR	Debt-to-Assets	Bottom Quartile ICR
Dependent variable:	**ln(rev)**	**ln(rev)**	**ln(capex)**	**ln(capex)**	**ln(rd)**	**ln(rd)**
Yr 2020 x Firm size 2019	0.001	-0.003**	-0.005	-0.011**	0.012***	0.010**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)
Yr 2021 x Firm size 2019	0.001	-0.004**	-0.040***	-0.043***	0.019***	0.019***
	(0.001)	(0.001)	(0.005)	(0.005)	(0.005)	(0.005)
Yr 2020 x Firm age 2019	-0.015***	-0.018***	-0.006	-0.012	-0.016	-0.020
	(0.003)	(0.004)	(0.016)	(0.017)	(0.019)	(0.020)
Yr 2021 x Firm age 2019	-0.021***	-0.022***	-0.041**	-0.037*	-0.007	-0.017
	(0.004)	(0.005)	(0.019)	(0.020)	(0.027)	(0.029)
Yr 2020 x Cash-to-assets 2019	-0.012***	-0.004	-0.053**	-0.066***	-0.031	-0.028
	(0.004)	(0.005)	(0.023)	(0.025)	(0.031)	(0.031)
Yr 2021 x Cash-to-assets 2019	-0.025***	-0.010*	-0.044*	-0.044	-0.089**	-0.077*
	(0.005)	(0.006)	(0.026)	(0.028)	(0.036)	(0.041)
Yr 2020 x ST Debt-to-debt 2019	-0.011**	-0.002	0.046*	0.059**	-0.011	-0.023
	(0.005)	(0.006)	(0.026)	(0.027)	(0.021)	(0.022)
Yr 2021 x ST Debt-to-debt 2019	-0.038***	-0.026***	0.061**	0.094***	-0.081***	-0.068**
	(0.006)	(0.007)	(0.030)	(0.031)	(0.026)	(0.027)
Yr 2020 x Debt-to-assets 2019	-0.032***		-0.126***		-0.048	
	(0.007)		(0.041)		(0.033)	
Yr 2021 x Debt-to-assets 2019	-0.035***		-0.237***		-0.062	
	(0.013)		(0.043)		(0.043)	
Yr 2020 x ICR 2019		-0.025***		-0.051**		0.017
		(0.004)		(0.020)		(0.019)
Yr 2021 x ICR 2019		-0.039***		-0.102***		-0.008
		(0.005)		(0.023)		(0.024)
Observations	219,683	133,863	64,495	54,241	23,828	19,994
Number of firms	73,261	44,643	21,836	18,292	8,049	6,750
R-squared	0.983	0.988	0.944	0.946	0.975	0.977
Adjusted R-squared	0.974	0.981	0.907	0.909	0.96	0.962
Firm FE	YES	YES	YES	YES	YES	YES
Country-Sector-Year FE	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. Firm size is measured by the log of total assets. Firm age is a dummy variable equal to one for firms in the top quartile of the sectoral age distribution. Cash-to-asset is a dummy variable equal to one for firms in the bottom quartile of the sectoral cash-to-asset distribution. ICR is a dummy variable equal to one for firms in the bottom quartile of the ICR distribution. Firm-level controls included but not shown in the table are those pertaining to inventories, listed vs unlisted companies and (for capex and R&D) revenues (see Section 3).
Source: Authors' calculations based on the S&P Capital IQ database.

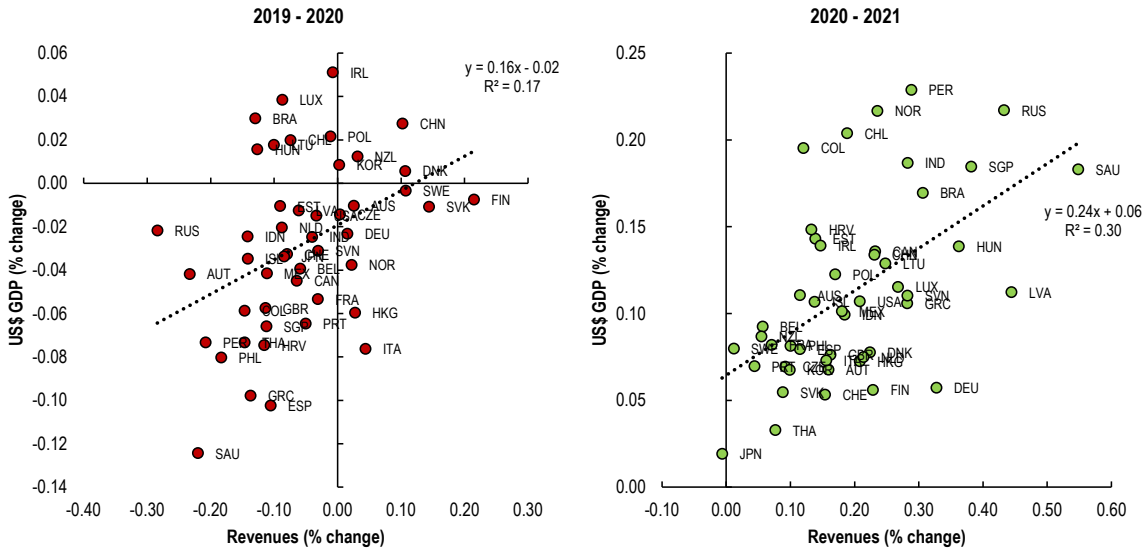
Table A A.7. The impact of the 2019-2020 change in firm financial characteristics on performance, including China

First differences regressions

Debt burden control variable:	(1) Debt-to-Assets	(2) Bottom Quartile ICR	(3) Debt-to-Assets	(4) Bottom Quartile ICR
Dependent variable:	**Capex**	**Capex**	**R&D**	**R&D**
	Log change 20-21	**Log change 20-21**	**Log change 20-21**	**Log change 20-21**
Cash-to-assets change 19-20	-0.180***	-0.175***	0.002	0.020
	(0.017)	(0.018)	(0.014)	(0.016)
Debt-to-assets change 19-20	-0.319***		-0.094**	
	(0.124)		(0.048)	
ICR change 19-20		-0.052**		-0.007
		(0.021)		(0.018)
Observations	21,095	16,470	7,949	6,244
R-squared	0.103	0.110	0.154	0.170
Country-Sector FE	YES	YES	YES	YES

Note: Standard errors in parentheses, clustered by firm. *** p<0.01, ** p<0.05, * p<0.1. Firm-level controls included but not shown in the table are those pertaining to size, age, short-term debt, inventories, listed vs unlisted companies and revenues (see Section 3). Consistent with previous estimations, we define the changes in liquidity and in the interest coverage ratio as categorical variables: more specifically, firms are considered to have experienced a sharp decline in liquidity (interest coverage) if they belong to the bottom quartile of the sectoral distribution of the 2019-2020 change in the Cash-to-assets ratio (ICR).
Source: Authors' calculations based on the S&P Capital IQ database.

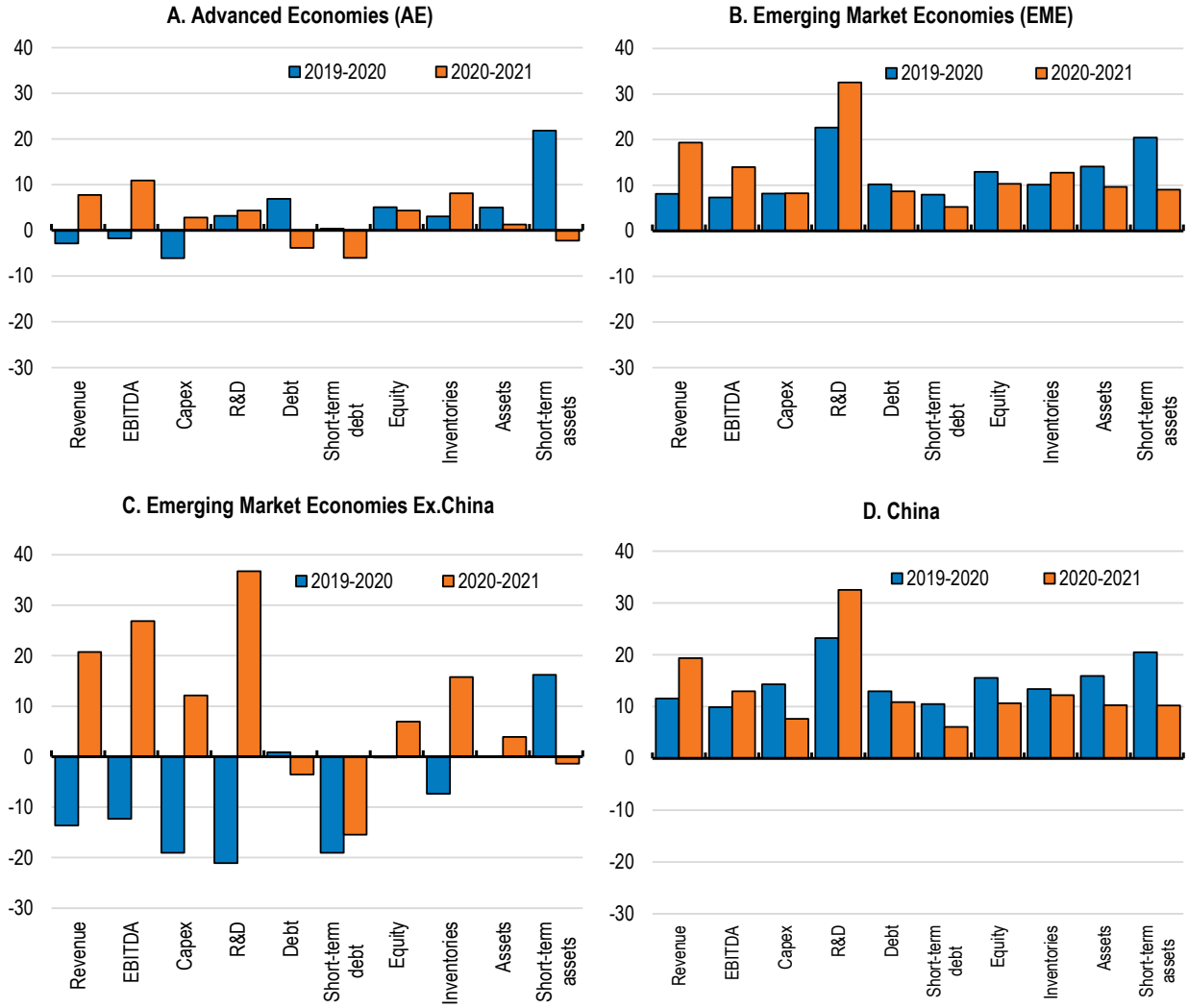
Figure A A.1. Correlation between annual growth in nominal GDP and total revenue



Note: Türkiye has been excluded from the figure as due to high inflation it would be visually an outlier. The overall positive correlation depicted in the charts still holds if Türkiye is included.
Source: Authors' calculations based on the S&P Capital IQ database.

Figure A A.2. Changes in key firm variables: 2019-2020 and 2020-2021

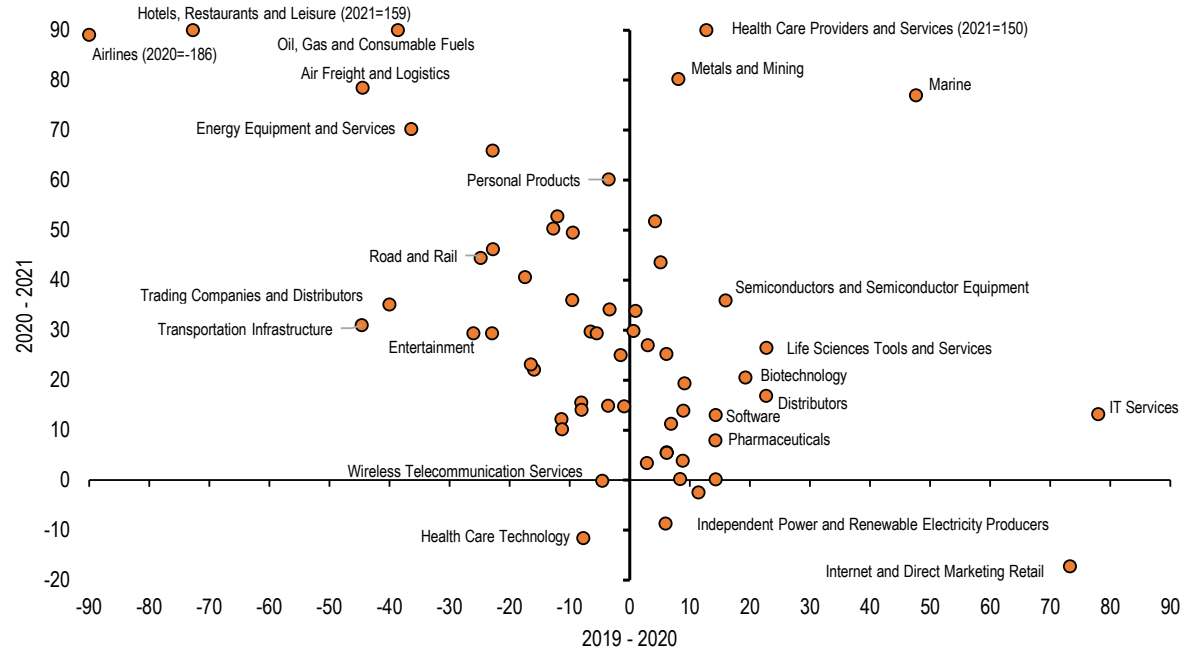
Median company, percentage



Note: We report the weighted median for each variable, using firms' asset size as weights.
Source: Authors' calculations based on the S&P Capital IQ database.

Figure A A.3. Annual change in EBITDA, 2019-2020 and 2020-2021

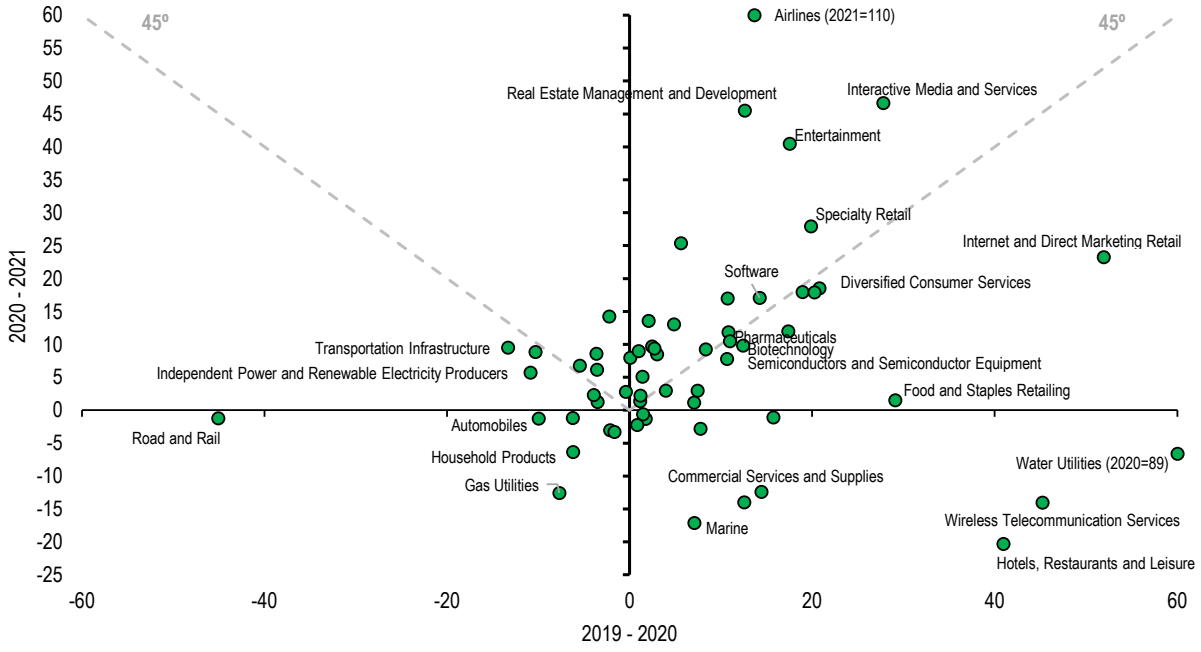
Sector aggregates, percentage change



Note: China is excluded from the sample. Each circle corresponds to an industry defined at a 3-digits disaggregation level (CIQ3).
Source: Authors 'calculations based on the S&P Capital IQ database.

Figure A A.4. Annual change in R&D expenditures, 2019-2020 and 2020-2021

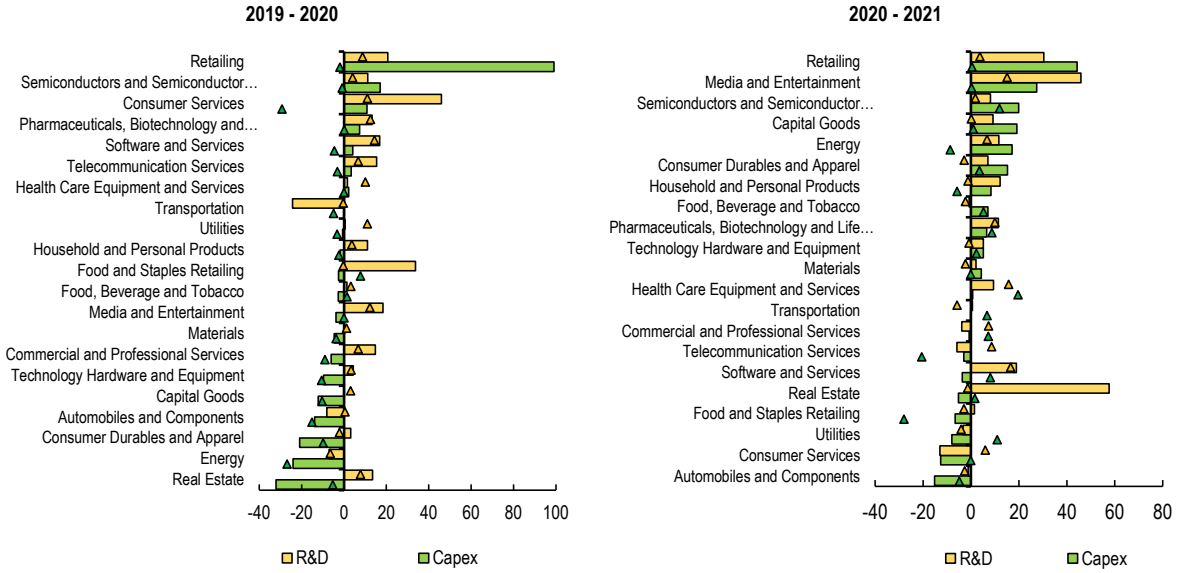
Sector aggregates, difference of logs



Note: China is excluded from the sample. Each circle corresponds to an industry defined at a 3-digit disaggregation level (CIQ3).
Source: Authors' calculations based on the S&P Capital IQ database.

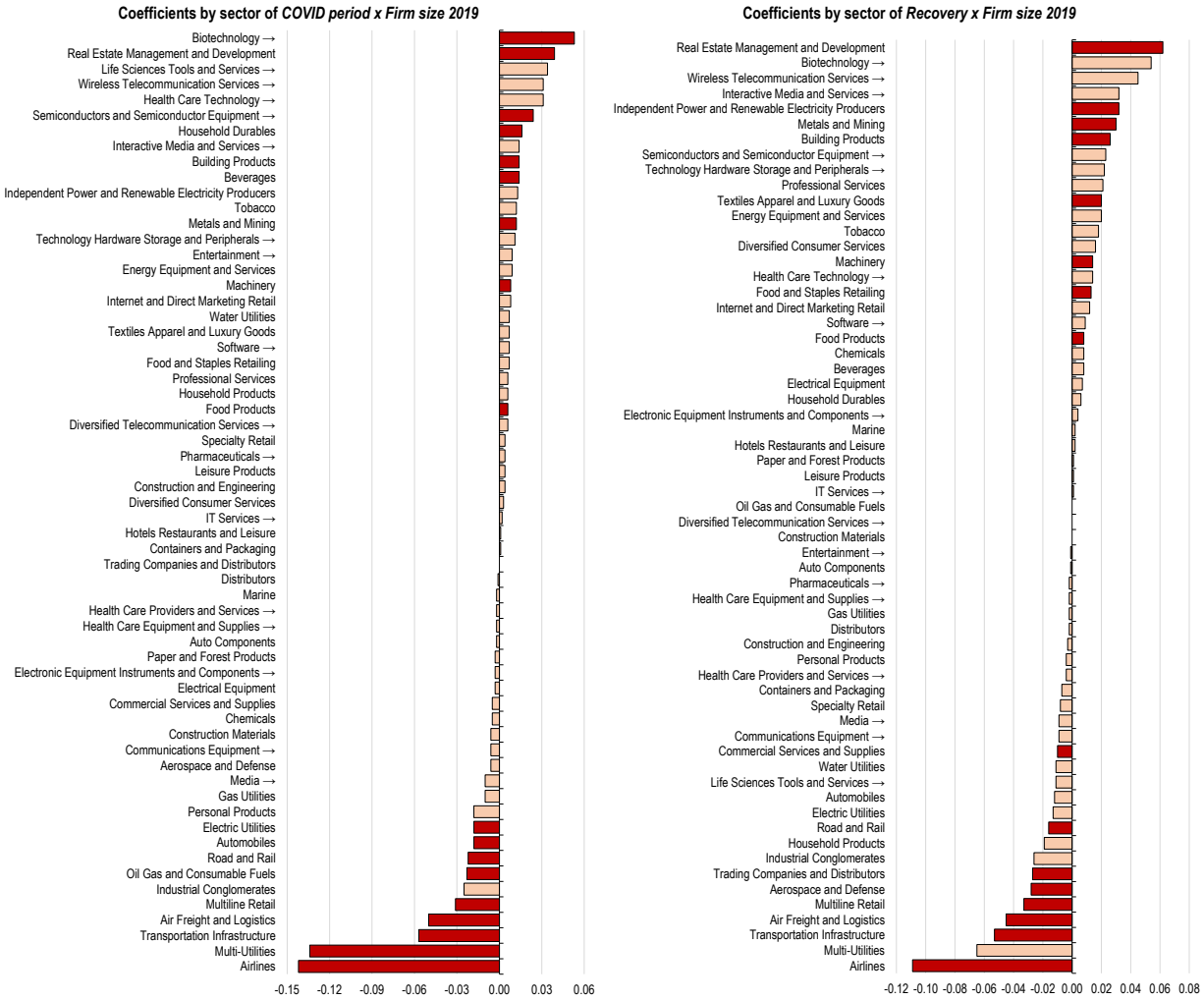
Figure A A.5. Annual change in capex and R&D expenditure

Sector aggregates, % change



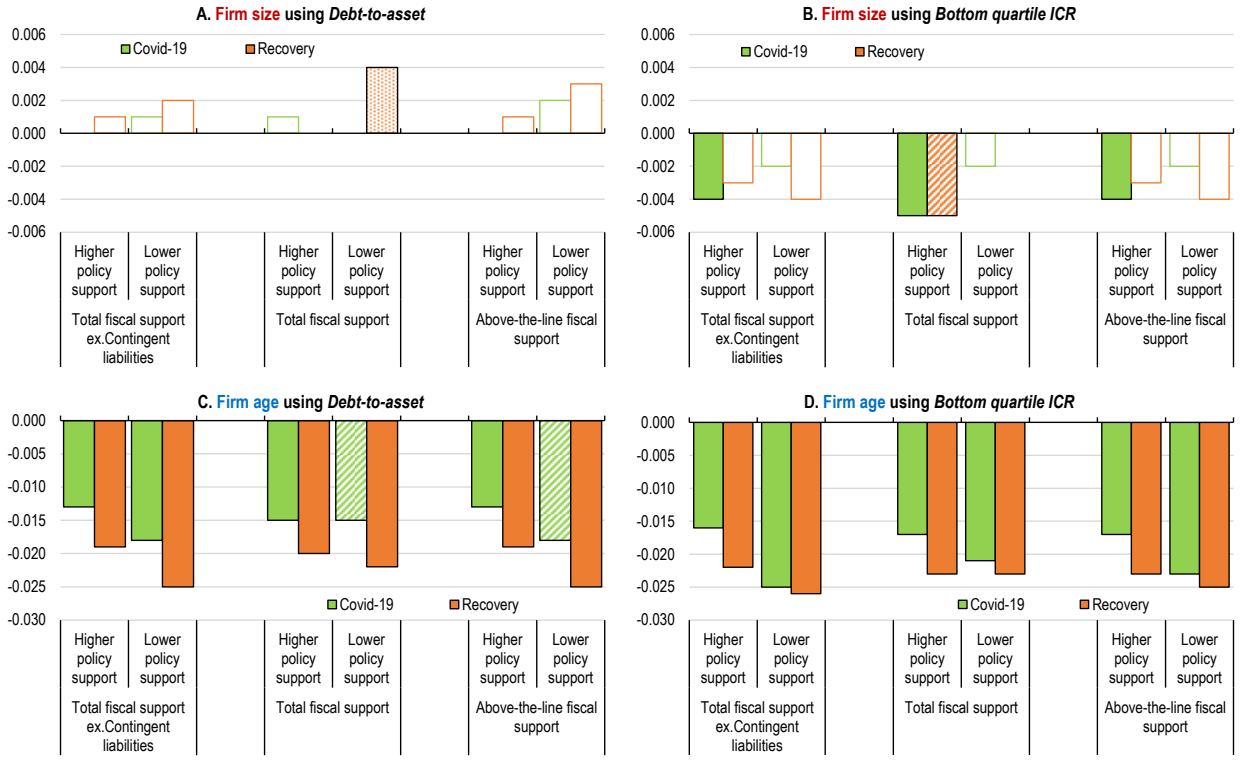
Note: China is excluded from the sample. Industries are defined at the 2-digit level (CIQ2). We use the sample of firms for which both Capex and R&D spending data is available for the three years. Triangles report the simple medians.
Source: Authors' calculations based on the S&P Capital IQ database.

Figure A A.6. Effect of size on revenues – Sector-specific regressions



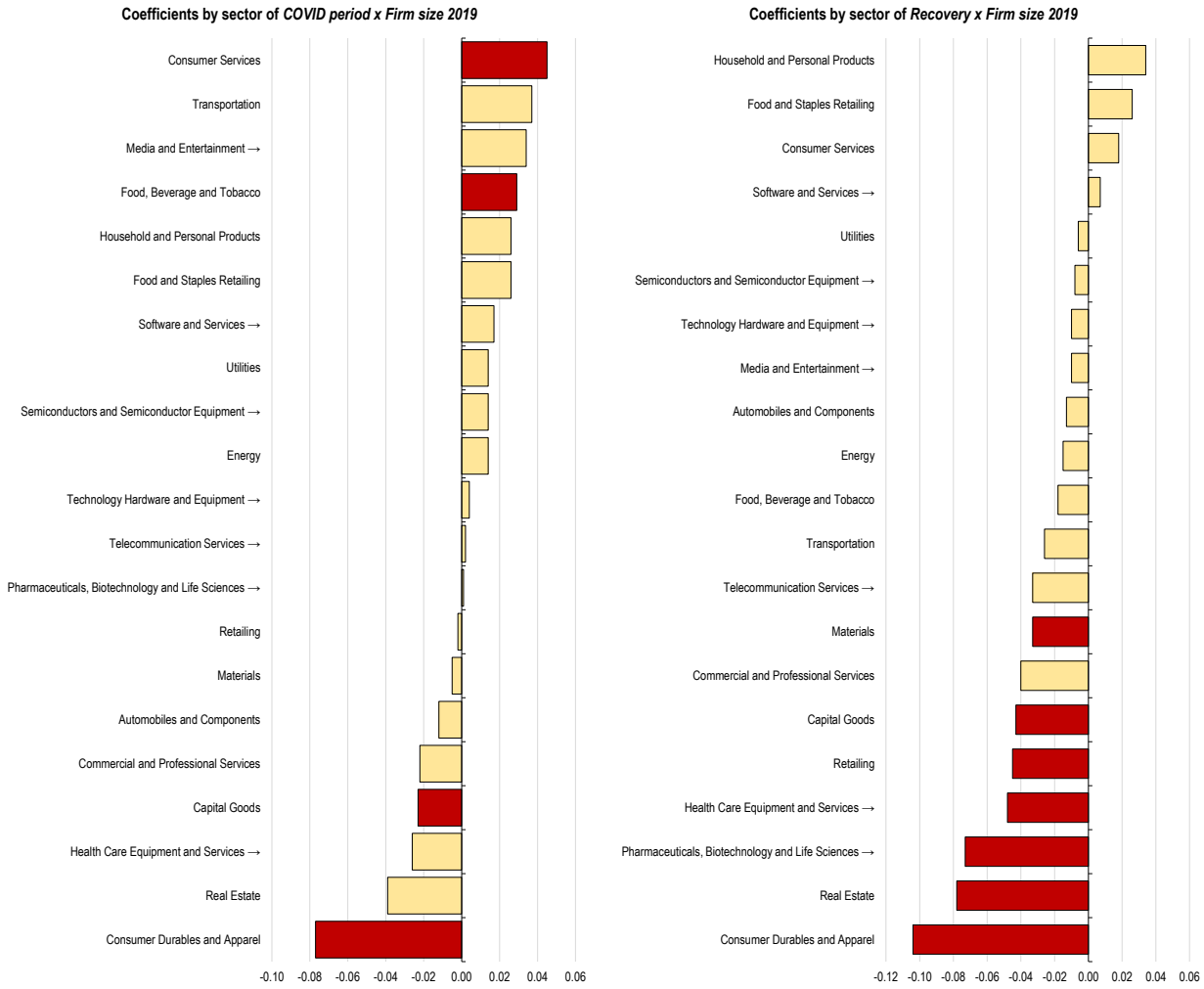
Note: China is excluded from the figure. The coefficients depicted correspond to running regression (1) for each sector at the 3-digit level (CIQ3) using Debt-to-assets as a measure of the debt burden and all the other variables. Sectors marked with an "→" correspond to the technology, media, health and pharmaceutical sectors. The red-filled bars correspond to those coefficients that are statistically significant at least at 90%.
Source: Authors' calculations based on the S&P Capital IQ database.

Figure A A.7. Effect of firm size and age on revenues in subsamples: alternative definitions of policy support



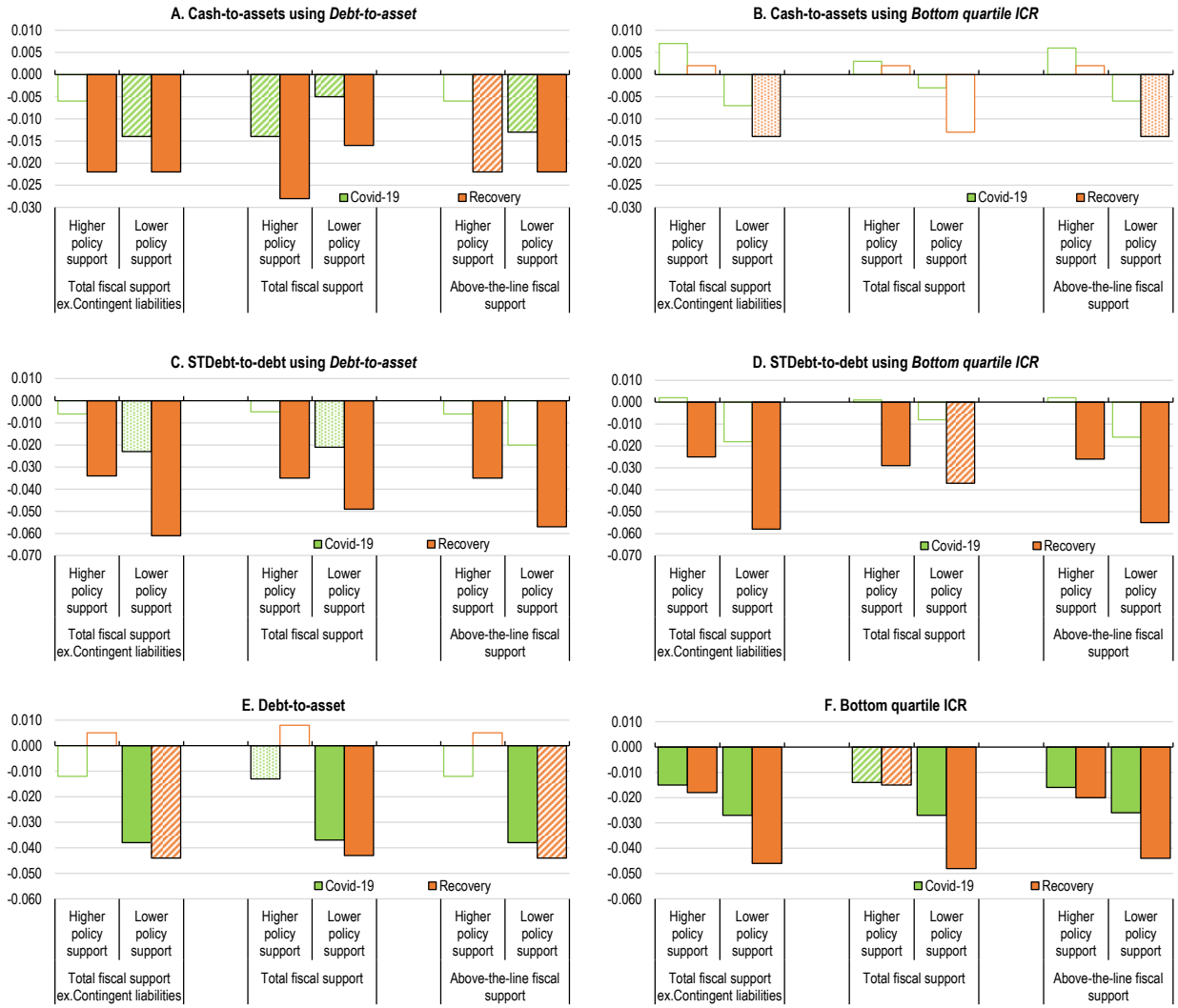
Note: China is excluded from the sample. Each bar corresponds to the coefficients associated to the log of assets in 2019 and the dummy variable of age in 2019 from the estimation of equation (1). Industries are defined at the 3-digit level (CIQ3). Higher and lower policy support are defined based on total fiscal support excluding contingent liabilities, total fiscal support including contingent liabilities and above-the-line fiscal support. Empty bars indicate non-significant coefficients, dotted bars indicate significance at 90%, dashed bars indicate significance at 95%, and filled bars indicate significance at 99%.
Source: Authors' calculations based on IMF (2021) and S&P Capital IQ database.

Figure A A.8. Effect of size on Capex – Sector-specific regressions



Note: China is excluded from the figure. The coefficients depicted correspond to running regression (1) for each sector at the 2-digit level (CIQ2) using Debt-to-assets as a measure of the debt burden and all the other variables. Due to lack of data, estimations for the Telecommunication Services sector do not include Inventories as a control. Sectors marked with an "→" correspond to the technology, media, health and pharmaceutical sectors. The red-filled bars correspond to those coefficients that are statistically significant at least at 90%.
Source: Authors' calculations based on the S&P Capital IQ database.

Figure A A.9. Effect of firm financial characteristics on revenues in subsamples: alternative definitions of policy support



Note: China is excluded from the sample. Each bar corresponds to the coefficients associated to each variable from the estimation of equation (1). Industries are defined at the 3-digit level (CIQ3). Cash-to-asset is a dummy variable equal to one for firms in the bottom quartile of the age distribution. ICR is a dummy variable equal to one for firms in the bottom quartile of the ICR distribution. Higher and lower policy support are defined based on total fiscal support excluding contingent liabilities, total fiscal support including contingent liabilities and above-the-line fiscal support. Empty bars indicate non-significant coefficients, dotted bars indicate significance at 90%, dashed bars indicate significance at 95%, and filled bars indicate significance at 99%.

Source: Authors' calculations based on IMF (2021) and S&P Capital IQ database.