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High-Growth Enterprises in times of COVID-19: an overview

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Executive Summary

The unexpected outbreak of COVID-19 and the resulting pandemic triggered an unprecedented shock to the economies and societies of EU member states. Across the globe, governments intervened in order to provide support to firms. Given the global crisis, it is important to understand in which ways firms have been affected by the COVID-19 pandemic and whether some types of firms have been more affected than others.

While recently several studies assessed the impact of the pandemic on firms across different dimensions, not much is known about the impact of the COVID-19 on High-Growth Enterprises (HGEs). High-Growth Enterprises attract significant policy interest because they make a disproportionately high contribution to economic growth and job creation. This paper contributes to a fast-growing literature on the impact of COVID-19 on the business economy, by focusing on how a particular group of firms - High-Growth Enterprises – have been affected by COVID-19 across several dimensions, such as investment expectations, investment priorities, employment decisions, and their post-COVID-19 green and digital transitions. In order to do so, we use the European Investment Bank Investment Survey (EIBIS).

Overall, the picture that emerges shows that HGEs (*i.e.*, firms that were HGEs up until the time of the COVID-19 shock) have indeed been adversely affected by the COVID-19 shock. HGEs and non-HGEs are overall similar, although some small differences can be observed that generally lean in the direction of suggesting that HGEs are slightly less vulnerable than non-HGEs to the COVID-19 shock. Some of the main findings can be summarised as:

- HGEs saw their expectations regarding investment drop from 2019 to 2020, but so did non-HGEs. HGEs actually are more likely than non-HGEs to invest in 2019 as well as in 2020.
- Expectations regarding the availability of internal finance (and to a lesser extent for external finance) have decreased quite dramatically from 2019 to 2020, although HGEs remain more optimistic than non-HGEs.
- Expectations regarding their sector's business prospects have decreased for HGEs, but – again – they have better expectations than non-HGEs.
- HGEs are more likely to have no investment planned in 2020 (compared to HGEs in 2019), and slightly less likely to invest in developing or introducing new products, processes or services, but – again – they still score higher than non-HGEs in terms of expected investment.
- Focusing specifically on changes in investment that are tied to COVID-19, HGEs are adversely affected overall, but are less likely to expect to invest less due to COVID-19, and more likely to invest more due to COVID-19 compared to non-HGEs.
- HGEs report that they are likely to delay investment plans due to COVID-19, but again the proportion of such HGEs is slightly lower than the corresponding share for non-HGEs.
- HGEs are likely to put staff temporarily on leave, make staff redundant or unemployed, or reduce the number of hours worked, compared to before COVID-19 - but again, non-HGEs do comparatively slightly worse than HGEs.
- HGEs may be more likely than non-HGEs to expect COVID-19 to have a long-term impact on the increased use of digital technologies (although the coefficient is not statistically significant).

- HGEs are more likely than non-HGEs to see the challenges of climate change as sources of new business opportunities.

Overall, our results suggest that High-Growth Enterprises can play a useful role in stimulating economic dynamism and reallocation, as EU member states recover from the worst effects of the COVID-19 shock. From a policy perspective, the plummeting expectations regarding the availability of internal and external finance highlight the importance of the large-scale public support programmes that have been implemented after the outbreak of the COVID-19 crisis in Europe to mitigate liquidity and solvency risks. Our results also point to the important role that HGEs play in supporting the green and digital transition. In this regard, the recovery instrument NextGenerationEU with the newly established Recovery and Resilience Facility (RRF) as its centerpiece provides not only a strong impetus for a sustainable recovery of European Member states after the initial COVID-19 shock, but also for the twin transition due to having a sizeable amount of investments and reforms specifically earmarked for digital and green components. Both of these elements will support new and potential HGEs, for instance by enabling their green investment ambitions, or by creating better framework conditions and opening up new business opportunities. The digital acceleration induced by the COVID-19 pandemic is already felt across the economy. Policy can further facilitate the uptake of digital technologies that would enable firms also to internationalize and to scale their business models, as well as more generally facilitate market access and integration. Given the crucial role of HGEs in the economy, it is worth thinking carefully about how HGEs can be supported through these testing times and beyond.

Abstract

This paper contributes to a fast-growing literature on the impact of COVID-19 on the business economy, by focusing on how a particular group of firms - High-Growth Enterprises (HGEs) – have been affected by COVID-19 across several dimensions, such as investment expectations, investment priorities, employment decisions, and their post-COVID-19 green and digital transitions. Using the EIB Investment Survey (EIBIS) and relying on descriptive statistics and basic regressions, the results suggest that COVID-19 has had a significant impact on the investment expectations of HGEs, although they continue to invest slightly more than non-HGEs. Preliminary results suggest that HGEs appear to be more optimistic than non-HGEs in a variety of dimensions, such as optimism surrounding the use of digital technologies, and willingness to invest in climate mitigation and adaptation. However, our evidence shows that the HGEs in the 2020 survey wave have still been hit hard by the COVID-19 shock, compared to HGEs in previous years, which suggests that there may be a role for policy for supporting these valuable firms.

1 Introduction

The unexpected outbreak of COVID-19 and the resulting pandemic triggered an unprecedented shock to the economies and societies of EU member states (Benedetti Fasil et al., 2021). Social distancing measures prevented employees from going to work, and prevented many firms from meeting the needs of their customers. The threat of mass unemployment suddenly loomed large, and firms faced drastically reduced revenues. The mix of heightened uncertainty, alongside reduced cash flows, forced many firms to delay or abandon their investment plans. Meanwhile, firms that had previously pursued strategies and business models that emphasized digitalization and online presence were observed to be relatively resilient (Bloom et al., 2021).

A growing number of studies have investigated how COVID-19 has affected firms' expectations, behaviour and performance (Benedetti Fasil et al., 2021; Andrews et al., 2021; Balduzzi et al., 2020; Buchheim et al., 2020; Marques Santos et al., 2021; Bloom et al., 2020, 2021; Brodeur et al., 2021). Firms have been strongly negatively impacted overall, although there is also important heterogeneity in the responses, with a minority of firms taking advantage of new opportunities and sales growth while most firms suffered heavy sales declines.

Some researchers have focused on the behaviour of different types of business such as small businesses and SMEs (Bartik et al., 2020; Gourinchas et al. 2020), for example regarding how these firms have maintained employees during the COVID-19 crisis (Bartik et al., 2020) or how productivity has been affected (Teruel et al., 2021). Others have highlighted how the pandemic has led to increased uncertainty (Altig et al., 2021) or to the decrease or postponement of investment projects (Buchheim et al., 2020).[1] Bloom et al. (2021) present evidence from a survey of US firms, and show that firms selling online have done better than those selling offline, that firms with employees fared better than those with no employees, and that there was considerable heterogeneity across sectors, with travel, clothing, and wedding photography being the worst hit.

Another strand of the literature relates to the wide range of COVID-19 support packages that have been set up by governments to provide assistance to vulnerable firms to weather the COVID-19 shock (Didier et al., 2021). Although there are concerns that these support measures are not reaching the firms that need them the most (Cirera et al., 2021), as well as concerns that these support measures have given artificial life support to firms that were near-insolvent even before COVID-19 appeared (Dorr et al., 2021), nevertheless the available evidence from European countries suggests that these support measures were reasonably well allocated. Lalinsky and Pál (2021) present evidence from Slovakia that firms that were particularly vulnerable (*i.e.*, firms in the most adversely affected sectors, relatively labour-intensive firms, and relatively productive firms) were more likely to receive wage subsidies. In contrast, financially distressed 'zombie firms', as well as firms with a highly negative environmental impact, were less likely to receive wage subsidies (Lalinsky and Pál, 2021). Bighelli et al (2021) present 4 main results for 4 European countries (Croatia, Finland, Slovakia, and Slovenia). First, COVID-19 support reached mainly mid-range productivity firms, which is good news because it is neither being given to high-productivity firms (who will survive without it) or to low-productivity firms (who may be less 'deserving' of support). Second, more productive firms received a lower relative size of the support, which is also encouraging because they presumably have lesser needs. Third, growing firms received more support, while only a small share of support went to 'zombies' (financially distressed) or declining firms. Fourth, productivity has dwindled during the COVID-19 pandemic, mainly because the usual selection effects, i.e. the forces of creative destruction that reallocate resources and market share towards 'fitter' better-performing firms, could not operate as usual amid circumstances of

[1] Moreover, German firms that were relatively weaker before the pandemic are also more likely to decrease employment (Buchheim et al., 2020).

severe economic disruption and strong government life-support interventions. Productivity-enhancing selection effects require that resources such as finance are allocated towards the promising innovative startups that need them the most.

Despite the quickly growing size of the literature, there are only few studies that focus on the impact of the COVID-19 pandemic on high-growth-enterprises (*e.g.*, Mason, 2020). This gap in the literature surrounding how the COVID-19 shock has affected HGEs is unfortunate, because there is considerable policy interest surrounding HGEs. On the one hand, HGEs make a disproportionately high contribution to economic growth and job creation, (Flachenecker et al., 2020; Benedetti Fasil et al., 2021), also during previous crisis periods (Flachenecker et al., 2021). On the other hand, HGEs may be especially vulnerable for a number of reasons. In good times, HGEs may be vulnerable because of uncertainties and information asymmetries surrounding their disruptive business strategies, or the dangers of rapid growth in terms of maintaining the fragile balance between revenues and costs (Coad et al., 2020), or the high costs of growth in terms of HGEs facing higher interest rates from banks (Rostamkalaei and Freel, 2016), or the difficulties of overcoming growth barriers such as requirements for skilled labour. In bad times, such as during the COVID-19 crisis, the vulnerability of HGEs will presumably become more pronounced, as dwindling demand combined with decreasing overall optimism and confidence will compound the problems faced in good times.

The aim of this paper is to contribute valuable insights regarding HGEs in times of COVID-19. In a first step, we focus on more short-term developments concerning investment expectations and employment adjustments to assess whether – and if so, to which extent - HGEs have been impacted along these two margins, compared to non-HGEs. In a second step, we also provide evidence on the role of HGEs regarding more structural trends, *i.e.*, the digital and green transformations in Europe, that are also at the heart of current EU policy initiatives such as the update of the EU's industrial strategy[2] or the implementation of the Recovery and Resilience Facility (RRF)[3] and the national Recovery and Resilience Plans (RRPs).

In order to do so, this paper uses a unique dataset, the European Investment Bank Investment Survey (EIBIS), and especially the 2020 wave that features new questions exclusively focused on the impact of COVID-19 across several dimensions. We seek to present some "stylized facts" regarding the short- and long-term adjustment of HGEs during COVID-19 using descriptive statistics and regression analysis, and explore how their behaviour across various dimensions differs from that of non-HGEs. Our intention is to provide a first general overview regarding these important developments that might be further investigated in more detail in subsequent work.

More closely related to our present paper is Benedetti Fasil et al. (2021), who focus on HGEs in Europe. First, they show that the COVID-19 crisis has had markedly different effects across industrial sectors. They also show that different EU member states have different degrees of exposure to at-risk sectors, because of their specific industrial structures. In particular, many HGEs are found in at-risk sectors, and (drawing on evidence from the Great Recession) we may be concerned about how the COVID-19 shock may reduce the overall shares of HGEs and, subsequently, lead to a decrease in economic dynamism. This paper on post-COVID-19 data also complements some previous related research into HGEs (Flachenecker et al., 2020; Reypens et al., 2020) and investment (Ambrosio et al., 2020, on EIBIS 2019 survey data) that was undertaken on pre-COVID-19 data on how firms vary across EU Member States. Another related paper is Balduzzi et al (2020), who present survey evidence on firms' post-COVID-19 investment expectations in the case of Italy (whereas we focus on all EU member states). Furthermore, our research in this area includes a sister paper (Coad et al., 2021) that focuses

[2] https://ec.europa.eu/commission/presscorner/detail/en/IP_21_1884 , last accessed 11th March, 2022.

[3] https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en last accessed 11th March, 2022.

on how vulnerable firms (HGEs as well as small firms, young firms, and R&D investors) have been hit by the COVID-19 shock, focusing on questions that have been asked in several EIBIS waves (hence prioritizing the time series dimension that exists for some EIBIS survey questions).

Our results suggest that, in a number of dimensions, HGEs are observed to be adversely affected by the COVID-19 shock, yet still seem to be doing a little bit better than non-HGEs. For example, HGEs saw their expectations regarding total investment drop from 2019 to 2020, but so did non-HGEs. In fact, investments are usually the most volatile business cycle element. Expectations regarding internal finance (and to a lesser extent for external finance) have decreased quite dramatically from 2019 to 2020, although HGEs remain more optimistic than non-HGEs. Focusing specifically on changes in investment that are tied to COVID-19, HGEs are adversely affected overall, but (compared to non-HGEs) are less likely to expect to invest less due to COVID-19, and more likely to invest more due to COVID-19. HGEs report that they are likely to delay investment plans due to COVID-19, but again the proportion of such HGEs is slightly lower than the corresponding share for non-HGEs. Furthermore, our results suggest that HGEs – compared to non-HGEs – are more likely to plan investment to tackle the challenges of climate change.

Overall, therefore, HGEs continue to be more likely than non-HGEs to invest, also in relation to investments to support the green transition. There seems to be an HGE "investment premium" when comparing HGEs to non-HGEs. However, an alternative line of comparison would be to compare HGEs in post-COVID-19 times to HGEs in previous waves, where the data allows. In this sense, HGEs during the COVID-19 crisis have lower investment than in previous years, which is a cause for concern and signals to policymakers that the needs of HGEs may require support in policy programmes such as industrial strategies, "Green Deal" policies, national Recovery and Resilience plans, and digital transition initiatives.

Section 2 presents the data and methodology. Section 3 presents the results, starting with an investigation of the determinants of HGEs before analysing their investment patterns, employment decisions, and possible transitions to a low carbon economy and digital technologies. Section 4 contains some concluding discussion. Supplementary results are presented in the appendices.

2 Data and methodology

2.1 Data description

Our analysis is based on the European Investment Bank Investment Survey (EIBIS) database, in particular the survey waves for each year from 2016 to 2020. EIBIS is an EU-wide survey that gathers a range of qualitative and quantitative information on the investment activities by non-financial corporates, both SMEs (5–250 employees) as well as larger corporates (250+employees), and also collects information on their financing requirements and the difficulties they face. EIBIS applies stratified sampling with a goal of being representative across all countries (all 27 Member States of the EU, as well as the UK and the USA), within countries, within four firm size classes (micro, small, medium and large) and four sector groupings (manufacturing, construction, services, and infrastructure). Brutscher et al., (2020) show that EIBIS is a reliable data source with no systematic sampling bias.[4] Overall, our sample includes more than 58,400 firms of which approximately 10% are HGEs.

When the EIBIS is performed, it typically collects information regarding the previous (just-completed) financial year. For instance, the survey performed in 2019 includes information about the full financial year of 2018. Typically, the EIBIS collects similar information across years, such as investment behavior and performance. However, the 2020 wave of EIBIS collects additional questions regarding the COVID-19 pandemic, namely forward-looking expectations regarding investment and employment. Considering that the EIBIS of 2020 includes information about the financial year of 2019, the information gathered is about expectations of COVID-19 (rather than objectively-measured financial data). For example, the EIBIS 2020 wave[5] contains some forward-looking questions about investment expectations, such as *"do you think that the availability of internal finance will improve, stay the same, or get worse over the next 12 months?"* While these questions cannot be interpreted as actual COVID-19 impacts, they have the strength of shedding light on COVID-19 patterns and outcomes that are simply not available in standard datasets (if we can consider that expectations and plans will ultimately correspond to actual investment behaviours).

In order to identify HGEs, we use the standard OECD-Eurostat definition of HGEs (Eurostat-OECD, 2007), *i.e.*, HGEs are enterprises with an average annualized employment growth of 10% or more per year over the past three years, as well as having 10 or more employees at the beginning of the growth period. For the EIBIS 2020 wave, for example, our HGE variable in the 2020 wave refers to realized growth performance during the period 2016-2019. As such, it is important to note that our indicator of HGEs for the EIBIS 2020 wave does not overlap with the COVID-19 crisis period.

Hence, when our analysis puts together HGE status with forward-looking questions on expectations regarding how COVID-19 has affected outcomes such as investment, it is essentially investigating how future expectations regarding investment are associated with HGE status in a previous and non-overlapping period. Our empirical setup is therefore not merely a tautology – our data is not constructed such that *e.g.* firms having high growth in period t have higher expected investment in period t. Instead, rapid growth over the period (t-3:t) is linked to investment expectations in the post-COVID-19 period $t+1$.

[4] For a detailed overview of the survey and its methodology, please see EIB Group Survey on Investment and Investment Finance Technical Report, October 2019 https://www.eib.org/attachments/eibis-methodology-report-2019-en.pdf (last accessed 11th March 2022).

[5] The EIBIS survey is typically carried out each year from May until August, and this was also the case for the 2020 EIBIS wave. Regarding the 2020 survey wave, the sampling period overlaps across countries, and therefore it is not the case that some countries are systematically surveyed either earlier or later in the development of the COVID-19 crisis.

2.2 Methodology

We start by focusing on different survey questions about HGEs activities and expectations regarding a variety of areas such as investment, employment decisions, use of digital technologies and green transition. We present the main descriptive statistics of responses provided by surveyed firms in tables and graphs. These statistics are weighted by value added, using sampling weights, which is standard practice for the EIBIS survey.[6] We focus on comparing results for the survey waves of 2019 and 2020 in order to get a first indication of the potential impact of COVID-19 across various dimensions. We also rely on specific COVID-19 related questions that have been included in the EIBIS 2020 survey.

Subsequently, we perform regression analysis to assess whether there are firms' characteristics which might be correlated with investment expectations, employment decisions, and investments in digitalization and climate-related areas. For the regression analysis, our covariates include dummies for the company size, company age, and sector of activity (Construction, Services, and Infrastructure, with Manufacturing as baseline). Depending on the specification, we include country fixed-effects, sector fixed-effects, or their interactions (country times sector of activity fixed-effects). We also include a dummy for HGEs, of particular relevance for our analysis, which allows to assess whether HGEs are significantly associated with different dependent variables. The set of controls is in line with the COVID-19 policy literature (*e.g.* Cirera et al., 2021).[7]

Our regressions often apply OLS-LPM models (Ordinary Least Squares – Linear Probability Model) even if the dependent variable is binary, because OLS-LPM has the advantage of having coefficient estimates that are relatively easy to interpret in terms of marginal effects (Angrist and Pischke, 2008).

[6] Please see EIB Group Survey of Investment and Investment Finance Technical Report, October 2020 https://www.eib.org/attachments/eibis-methodology-report-en.pdf. As explained in the report, *"[t]his approach gives more weight to firms with larger economic importance (based on their sector/size membership), which is a better fit to the analysis objectives of the survey than a firm-level approach which would give equal weighting to each firm in the economy*". The results hold when not considering weights

[7] The set of control variables in Cirera et al. (2021, p44) is: "dummies for size, sector (*i.e.*, 10 sectors), country, and the timing of the survey in terms of weeks relative to the peak of the COVID-19 shock."

3 Results

In this section, we present the results obtained from the EIBIS with a particular focus on the most recent EIBIS 2020 survey with a view to assess whether there are relevant differences between HGEs and non-HGEs in their perceptions and responses to COVID, regarding areas such as expected investment, the need to fire staff after COVID, and investments in digital technologies and climate-related areas. Appendices contain some additional information on HGEs and their characteristics.[8]

3.1 Investment patterns

3.1.1 Expected investment dynamics

We start our analysis by focusing on the EIBIS questions that relate to investment expectations. In particular, EIBIS asks respondent firms whether their investment in the current period is expected to be: greater than last year; approximately the same as last year; less than last year; or if no investment is planned. Hence, this particular question contains forward-looking information about expected investment behaviour, which in the case of the EIBIS 2020 survey wave corresponds to expectations made after the onset of COVID-19 pandemic. Comparing the results from this survey question from the EIBIS 2020 with the EIBIS 2019 wave provides a first indication of the impact of COVID-19 on investment expectations.

Table 1: Changes in expected total investment in the current financial year.

	Non-HGEs (%)		HGEs (%)		Change 2019-2020 (%)	
	2019	2020	2019	2020	Non-HGEs	HGEs
A. More than last year	29.4	19.3	39	24.9	-10.1	-14.1
B. Around the same amount as last year	42.7	24	37.7	22.9	-18.7	-14.8
C. Less than last year	22.1	47	19.6	42.4	24.9	22.8
D. No investment planned	5.1	9.2	3.1	7.3	4.1	4.2

Source: Percentage of firms choosing each response; column totals calculated after removing "Refused" and "Don't Know." Value added weights are applied.

Table 1 above shows that the share of HGEs that expect to invest more in the current financial year than in the previous year is higher than non-HGEs (both for 2019 and 2020 survey waves). In 2020, the proportion of firms reporting that they expect their total investment to be higher than the previous year decreased 14 percentage points for HGEs (from 39% in 2019 to 25% in 2020) and 10 percentage points for non-HGEs (from 29% on 2019 to 19% in 2020). The decrease was even higher for the proportion of firms reporting that they expect their investment to be approximately the same as last year: there was a 19 percentage points decrease in 2020 for non-HGEs (from 43% to 24%) and 15 percentage points decrease for

[8] Appendix A contains a general description of HGEs and their characteristics, Appendix B provides results on the investment barriers faced by HGEs, and Appendix E disaggregates HGEs according to technological macrosectors.

HGEs (from 38% to 23%). A significant proportion of firms reported that they expect their total investment to be lower than the previous year, with non-HGEs reporting a higher proportion than HGEs (47% vs 42%). Hence, while COVID-19 has had a large impact on expected investment by both HGEs and non-HGEs, these descriptive statistics seem to suggest that HGEs are not more vulnerable than non-HGEs in terms of investment expectations.

In order to probe further into the possible reasons behind these differences in investment expectations and to control for background factors, Table 2 presents regression results on the determinants of investment expectations. The regression considers EIBIS waves 2018, 2019 and 2020 that are pooled together. Column (1) includes country fixed-effects, column (2) includes country fixed-effects as well as country × sector fixed effects column (3) includes the HGE dummy, and column (4) includes the HGE dummy and the interaction term (HGEs × year2020) in order to determine whether investment expectations for HGEs in 2020 differ from those from the previous year.

In general, HGEs are more likely to invest in the current year, as shown by the positive coefficient for HGE (column (3)). However, the interaction term *HGE × 2020* shows that HGEs in the 2020 wave (compared to previous years) are less likely to expect to invest more. This qualifies the evidence in Table 1 and suggests that, controlling for age, size, sector and country, COVID-19 has had a detrimental effect on the investment plans of HGEs – i.e., that they are 3.2 percentage points less likely to report that they expect to invest more in the current year compared to what might be expected from HGEs in 'normal times'.[9] Taking together the evidence in Tables 1 and 2, HGEs continue to have more ambitious investment plans than non-HGEs, but HGEs have experienced a larger drop in post-COVID-19 investment expectations than non-HGEs, such that the gap between HGEs and non-HGEs has decreased.

[9] A more detailed analysis of the investment expectations of HGEs can be found in the sister paper (Coad, 2021).

Table 2 OLS-LPM regressions on the determinants of investment expectations.
Dependent variable: dummy equal to one if amount of investment is expected to be more than in the previous year, and zero otherwise.

	(1)	(2)	(3)	(4)
VARIABLES	**Invest more**	**Invest more**	**Invest more**	**Invest more**
HGE dummy			0.047***	0.057***
			[0.009]	[0.011]
Interaction: HGE x 2020				-0.032*
				[0.017]
Small Company	0.032***	0.032***	0.022***	0.022***
	[0.007]	[0.007]	[0.007]	[0.007]
Medium Company	0.049***	0.049***	0.041***	0.041***
	[0.007]	[0.007]	[0.008]	[0.008]
Large Company	0.058***	0.057***	0.050***	0.050***
	[0.009]	[0.009]	[0.009]	[0.009]
Company Age: 2 to 5 years	-0.026	-0.027	-0.041	-0.040
	[0.044]	[0.044]	[0.067]	[0.067]
Company Age: 5 to 10 years	-0.053	-0.053	-0.065	-0.064
	[0.042]	[0.043]	[0.066]	[0.066]
Company Age: 10 to 20 years	-0.071*	-0.074*	-0.088	-0.087
	[0.042]	[0.042]	[0.066]	[0.066]
Company Age: 20 or more years	-0.083**	-0.084**	-0.094	-0.094
	[0.042]	[0.042]	[0.065]	[0.066]
Wave 2019 dummy	-0.021***	-0.020***	-0.017***	-0.018***
	[0.006]	[0.006]	[0.006]	[0.006]
Wave 2020 dummy	-0.120***	-0.119***	-0.118***	-0.114***
	[0.006]	[0.006]	[0.006]	[0.006]
Construction Sector	-0.040***	yes	yes	yes
	[0.007]			
Services Sector	-0.027***	yes	yes	yes
	[0.007]			
Infrastructure Sector	-0.015**	yes	yes	yes
	[0.007]			
Observations	33,391	33,391	31,631	31,631
R-squared	0.024	0.028	0.030	0.030
Country FE	yes	yes	yes	yes
Country x sector FE	no	yes	yes	yes

Notes: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Constant terms included in all regressions but not reported in detail.

Table 1 showed that expected investment is down in 2020, nevertheless it is interesting that there are still 25% of HGEs that plan to invest more than in the previous year. It is worthwhile investigating further which factors might be driving this. As such, Table 3 below presents a

multinomial logistic regression with 4 outcomes (expect to invest "more than last year"; "less than last year"; and "no investment planned", with the omitted baseline reference case being "around the same amount as last year") focusing only on the year 2020.

Table 3. Multinomial logistic (MNL) regression results for the 2020 survey wave.
Dependent variable: how total investment spend in the current year compares to that of last year. Baseline reference category: "around the same amount as last year".

	Model (1)			**Model (2)**			**Model (3)**		
VARIABLES	**More than last year**	**Less than last year**	**No investment planned**	**More than last year**	**Less than last year**	**No investment planned**	**More than last year**	**Less than last year**	**No investment planned**
HGE dummy							0.225**	0.139	0.037
							[0.098]	[0.088]	[0.131]
Small Company	-0.007	-0.030	-0.505***	-0.018	-0.044	-0.512***	-0.064	-0.060	-0.539***
	[0.081]	[0.072]	[0.084]	[0.082]	[0.072]	[0.085]	[0.085]	[0.074]	[0.088]
Medium Company	-0.031	0.073	-1.245***	-0.043	0.063	-1.246***	-0.068	0.042	-1.237***
	[0.085]	[0.074]	[0.099]	[0.087]	[0.075]	[0.101]	[0.090]	[0.077]	[0.105]
Large Company	-0.139	0.119	-2.101***	-0.150	0.097	-2.106***	-0.152	0.112	-2.124***
	[0.101]	[0.086]	[0.156]	[0.103]	[0.088]	[0.157]	[0.106]	[0.090]	[0.164]
Company Age: 2 to 5 years	-0.775	-0.277	-0.823	-0.787*	-0.227	-0.813	-0.148	-0.511	-0.271
	[0.476]	[0.495]	[0.574]	[0.472]	[0.483]	[0.571]	[0.739]	[0.635]	[0.927]
Company Age: 5 to 10 years	-0.834*	-0.044	-0.505	-0.841*	-0.012	-0.503	-0.171	-0.241	0.093
	[0.461]	[0.482]	[0.556]	[0.457]	[0.470]	[0.552]	[0.727]	[0.622]	[0.913]
Company Age: 10 to 20 years	-0.854*	-0.007	-0.685	-0.849*	0.038	-0.672	-0.183	-0.181	-0.068
	[0.456]	[0.477]	[0.551]	[0.452]	[0.466]	[0.548]	[0.723]	[0.618]	[0.909]
Company Age: 20 or more years	-0.887*	0.049	-0.678	-0.882**	0.096	-0.667	-0.207	-0.118	-0.072
	[0.453]	[0.476]	[0.549]	[0.449]	[0.464]	[0.546]	[0.722]	[0.617]	[0.908]
Construction Sector	-0.431***	-0.468***	-0.569***	yes	yes	yes	yes	yes	yes
	[0.081]	[0.071]	[0.098]						
Services Sector	-0.155*	-0.070	-0.102	yes	yes	yes	yes	yes	yes
	[0.079]	[0.069]	[0.095]						
Infrastructure Sector	-0.389***	-0.415***	-0.402***	yes	yes	yes	yes	yes	yes
	[0.078]	[0.067]	[0.097]						
Observations	11,222			11,222			10,744		
Country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country X sector FE	no	no	no	yes	yes	yes	yes	yes	yes

Notes: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Constant terms included in all regressions but not reported in detail..

Table 3 shows multinomial logistic regression results for various investment categories. A robust finding is that older firms are less likely to invest more than last year, although this

could be partly explained by the fact that older firms are less likely to be HGEs. Model (3) in Table 3 shows that HGEs are more likely to expect to invest more than last year, as such corroborating the results from Table 2, although HGEs are no different from non-HGEs with respect to the investment categories “less than last year” or “no investment planned.”

3.1.2 Potential investment drivers

The observed patterns in firms’ investment expectations might also be linked to perceived changes of the business environment. Table 4 below provides an overview of how firms perceive various dimensions of their business environment. In order to proxy for the influence of the COVID-19 shock, we compare responses for the years 2020 and 2019 that show large differences in terms of perspectives on the business environment in various areas: conditions regarding both internal finance and external finance are expected to deteriorate; and sector/industry prospects are expected to deteriorate and not to improve. Regarding internal finance, the numbers thinking that the situation will improve has crashed down from 2019 to 2020, from 38.7% to 21.5% for HGEs, and from 26.0% to 12.2% for non-HGEs. Meanwhile, respondents are much more likely to consider that the conditions for internal finance will “deteriorate” in 2020 compared to 2019 (e.g. 23% of HGEs in 2020 compared to 5% of HGEs in 2019).

The share of firms reporting that they expect the overall economy to deteriorate jumped up from 33.8% to 64.9% for HGEs (and 35.3% to 68.4% for non-HGEs).

Regarding the political/regulatory environment, however, there is some polarization which might also partly reflect the uncertainty about the impact of the various policy decisions to support the business economy that have been taken since the outbreak of the COVID-19 crisis (Benedetti-Fasil et al., 2021; Brodeur et al., 2021): the category of "improve" has a slightly larger share of responses in 2020 compared to 2019, while simultaneously the category of "deteriorate" has also grown in proportion from 2020 compared to 2019 (with these changes being compensated by losses in the category of "stay the same").

Table 4 Responses to a question regarding whether the following will improve, stay the same, or get worse over the next 12 months.
Responses disaggregated across years (2019 and 2020) for HGEs and non-HGEs.

		2019		2020		Change (in percentage points)		Difference in change HGEs – nonHGEs
		non-HGEs (%)	HGEs (%)	non-HGEs (%)	HGEs (%)	non-HGEs	HGEs	
Internal finance	Improve	26.0	38.7	12.2	21.5	-13.8	-17.2	-3.4
	Stay the same	62.8	55.0	54.6	53.7	-8.2	-1.3	6.9
	Deteriorate	8.6	5.0	31.7	23.0	23.1	18	-5.1
External finance	Improve	18.2	24.7	18.7	27.7	0.5	3	2.5
	Stay the same	66.6	64.5	54.0	45.3	-12.6	-19.2	-6.6
	Deteriorate	9.0	5.0	21.1	20.9	12.1	15.9	3.8
Sector's prospects	Improve	31.0	44.4	21.1	32.0	-9.9	-12.4	-2.5
	Stay the same	48.0	39.6	34.0	35.4	-14	-4.2	9.8
	Deteriorate	18.7	13.9	42.2	31.0	23.5	17.1	-6.4
Overall economy	Improve	17.5	24.4	16.8	16.0	-0.7	-8.4	-7.7
	Stay the same	43.9	38.7	12.8	16.6	-31.1	-22.1	9
	Deteriorate	35.3	33.8	68.4	64.9	33.1	31.1	-2
Political/regulatory	Improve	10.2	14.4	13.2	14.7	3	0.3	-2.7
	Stay the same	48.1	47.3	42.2	36.9	-5.9	-10.4	-4.5
	Deteriorate	35.4	32.9	38.9	44.4	3.5	11.5	8

Notes: column totals calculated after dropping "Refused" and "Don't know." Value added weights are applied.

3.1.3 Investment priorities

Table 5: Investment priority in the next three years for HGEs vs non-HGEs, for survey waves 2019 and 2020.

	2019		2020		Change in percentage points	
	non-HGE (%)	HGEs (%)	non-HGEs (%)	HGEs (%)	non-HGEs	HGEs
A. Replacing capacity (including existing buildings, machinery, equipment and IT)	34.9	22.3	32.4	22.9	-2.5	0.6
B. Capacity expansion for existing products/services	27.2	36.4	25.5	34.4	-1.7	-2.0
C. Developing or introducing new products, processes or services	24.0	31.4	26.4	30.1	2.4	-1.3
D. Or do you have no investment planned?	10.0	8.2	13.5	10.8	3.5	2.6

Notes: column totals calculated after dropping "Refused" and "Don't know." Value added weights are applied. Survey wave 2020 (2019, respectively) refers to growth performance (HGE status) over the period 2016-2019 (2015-2018, respectively).

Apart from the assessment of expected economic conditions and investment plans for the current year, the survey also provides information on the investment outlook and priorities over the next three years. Table 5 analyzes the emerging investment priorities for HGEs and non-HGEs, comparing forward-looking responses for 2020 with responses to the same question reported for 2019.[10]

Table 5 shows that the category of firms with no investment planned has grown slightly from 2019 to 2020 (8.2% to 10.8% for HGEs; and 10.0% to 13.5% for non-HGEs). HGEs are slightly less likely to report being in the category of firms developing or introducing new products (e.g. from 31.4% in 2019 to 30.1% in 2020 for HGEs), although the corresponding proportion for non-HGEs has increased slightly (from 24.0% to 26.4%). Comparing 2020 to 2019, fewer firms responded that their investment priorities are in the area of capacity expansion for existing products. Overall, there appears to be a general trend towards cutting investment plans, although Table 5 suggests that the differences from the previous year are slight.

3.1.4 COVID-19 expected impact on investment

The COVID-19 pandemic might have affected companies differently, and different types of firms might have adopted various strategies in order to mitigate the impact of the current crisis.

In order to further understand the specific impacts of COVID19, the survey included specific questions about possible impacts of the pandemic in the EIBIS 2020 survey wave. For instance, respondent firms were asked whether their investment expectations for 2020 changed due to COVID-19 (Table 6). This question is tailored to measure the specific COVID-19 impact on investment expectations and thus complements the more general question on investment expectations over the following three years which is included regularly in the EIBIS waves and analyzed in section 3.1.1.

Table 6: Responses regarding whether the company's overall investment expectations for 2020 changed due to Coronavirus.

	Non-HGEs (%)	HGEs (%)	Total (%)
Expecting to invest more due to COVID	6.8	8.7	7.0
Expecting to invest less due to COVID	46.6	43.7	46.3
Our investment levels will not be affected by COVID	45.2	47.1	45.3

Notes: Value added weights are applied.

The results in Table 6 are somewhat similar to the results shown earlier in Table 1 regarding expected investment (over the following three years), although the question in Table 6 is more directly tied to COVID.11 The majority of responses are in the categories of investing less due to COVID, or not being affected by COVID. In the case of non-HGEs, slightly more firms report

[10] A complementary and more detailed analysis of the investment expectations of HGEs in times of COVID-19, applying difference-in-difference regressions and graphs, can be found in a sister paper (Coad, 2021).

[11] Table 1 compares expected investment this year with investment last year. In contrast, table 6 seems to be comparing investment expectations (in the current COVID-19 era) with the counterfactual situation of what investment would have been in the absence of COVID-19 (*i.e.* Table 6 focuses on changes in investment that are specifically due to COVID-19).

expecting to invest less due to COVID-19 than being unaffected by COVID-19 (46.6% vs 45.2%, respectively). The responses are the other way around for HGEs, with slightly more firms reporting that their investment levels will not be affected by COVID, compared to those expecting to invest less (47.1% vs 43.7%, respectively). Table 6 also shows that HGEs are more likely to respond that they will invest more due to the Coronavirus (8.7% for HGEs, 6.8% for non-HGEs). At face value, this suggests that HGEs are less vulnerable than non-HGEs.

Appendix D explores how changes in investment expectations vary across disaggregated sectors.

Table 7 below probes deeper into the responses to this survey question, with the regression equation focusing more specifically on investment behavior due to the outbreak of the COVID-19 crisis. Of main interest are the results for HGEs: they are 3.1 percentage points more likely than non-HGEs to report that they will invest more due to COVID. Hence, HGEs still maintain a 'premium' of higher investment expectations compared to non-HGEs, although (as seen earlier in Tables 1 and 2) HGEs in the 2020 survey wave have decreased their investment expectations compared to HGEs in previous survey waves.

Concerning the other control variables, firm size is a relevant predictor for investment expectations: micro firms (and to a lesser extent, small firms) are relatively more likely to invest more due to COVID-19.[12] No significant results for age categories are found. Firms in the construction and infrastructure sectors seem less likely to invest more due to COVID-19.

[12] A possible reason why micro firms might invest more due to COVID-19 could be because of their more nimble and flexible business processes, which allow them to reposition their businesses in a post-COVID-19 landscape (for example via investments in digitalization). Another possible reason could be due to possible sample selection effects in our survey data, despite precautions that have been taken to ensure representativeness. Another reason could be because micro firms operate in market niches that encourage them to invest more due to COVID-19. Finally, it is possible that micro firms benefitted from generous state support during the COVID-19 crisis while being protected from the usual "creative destruction" from selection pressures (Bighelli et al., 2021), which included access to cheap government loans (Gourinchas et al., 2021), which has encouraged them to invest.

Table 7: Regression results on investment expectations.
Dependent variable: dummy variable: overall investment expectations for 2020 are to invest more due to COVID-19.

	(1)	(2)	(3)
VARIABLES	Invest more	Invest more	Invest more
HGE dummy			0.031***
			[0.010]
Small Company	-0.019**	-0.020**	-0.028***
	[0.009]	[0.009]	[0.009]
Medium Company	-0.043***	-0.044***	-0.051***
	[0.008]	[0.008]	[0.009]
Large Company	-0.056***	-0.058***	-0.065***
	[0.009]	[0.009]	[0.009]
Company Age: 2 to 5 years	-0.005	-0.001	-0.044
	[0.050]	[0.049]	[0.085]
Company Age: 5 to 10 years	0.020	0.024	-0.023
	[0.048]	[0.048]	[0.084]
Company Age: 10 to 20 years	-0.003	0.004	-0.040
	[0.048]	[0.047]	[0.083]
Company Age: 20 or more years	-0.012	-0.006	-0.047
	[0.048]	[0.047]	[0.083]
Construction Sector	-0.016**	yes	yes
	[0.007]		
Services Sector	0.018**	yes	yes
	[0.007]		
Infrastructure Sector	-0.019***	yes	yes
	[0.007]		
Observations	10,218	10,218	9,751
R-squared	0.030	0.041	0.043
Country FE	yes	yes	yes
Country × sector FE	no	yes	yes

Notes: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Constant terms included in all regressions but not reported in detail.

Table 8 narrows down on the subsample of firms who expect to invest less due to COVID-19, and shows roughly the same responses from HGEs and non-HGEs regarding whether they will abandon, delay, or change/reduce the scale/scope of investments. HGEs are very slightly less likely to abandon or delay investment plans, and slightly more likely to continue investment plans (with a different or reduced scale or scope). In this sense, HGEs seem to have slightly more perseverance in their investment plans than non-HGEs, although it could well be the case that HGEs in the 2020 wave have less perseverance in investment plans than HGEs in previous years.[13]

[13] This possibility cannot be investigated, because this survey question was not asked in previous EIBIS waves.

Table 8: Responses regarding whether the company's overall investment expectations for 2020 changed due to Coronavirus.
This question is only asked to those firms who declare that they will invest less due to COVID-19. Answers regarding the actions taken are: A. Abandon investment plans; B. Delay investment plans; C. Continue investment plans with different or reduced scale or scope. Multiple responses are allowed.

	non-HGEs (%)	HGEs (%)
A. Abandon investment plans	14.56	10.92
B. Delay investment plans	76.95	75.41
C. Continue investment plans with different or reduced scale or scope	43.92	44.95

Notes: Responses to the 2020 survey. Value added weights are applied.

3.2 Employment decisions

The COVID-19 pandemic impacted active employment, with many companies reporting a decline in employment. Bartik et al. (2021) assess the impact on US SME firms and find that the impact varied across sectors and regions. In this section, we consider how COVID-19 impacted firms' employment decisions.[14]

We begin with an analysis of the following question asked in the EIBIS: "Thinking about the impact of coronavirus, have you had to put staff temporarily on leave, make staff redundant or unemployed or reduce the number of hours they work compared to before the coronavirus pandemic?" Table 9 presents the results. HGEs and non-HGEs are present in all categories in roughly equal proportions. A few differences are observed, for example HGEs are slightly more likely than non-HGEs to have increased employment despite COVID-19 (4% vs 2%).

Table 9: Responses regarding whether firms have had to put staff temporarily on leave, make staff redundant or unemployed or reduce the number of hours they work compared to before the coronavirus pandemic.

	Percentage of firms	
	non-HGEs (%)	**HGEs (%)**
Yes, up to a quarter	26	22
Yes, up to half	13	10
Yes, up to three quarters	7	9
Yes, three quarters or more	16	18
No, but we will start to take action in the next three months	4	3
No and we don't need/intend to take any of these actions	30	33
No, we have increased staff numbers and/or the number of hours our staff work	2	4

Notes: Responses to the 2020 survey. Value added weights are applied. Column totals do not add up to 100% because responses for "Don't Know" and "Refused" are not shown.

Table 10 (below) investigates using regression analysis which firms are more resilient against pressure to fire staff due to COVID-19. Micro firms (the omitted baseline reference category) are more likely to report that there is no need to fire staff due to COVID-19. In general, larger firms seem more likely to report needing to fire staff after COVID-19 (in line with Bartik et al.,

[14] Teruel (2021, forthcoming) investigates in more detail how firms' employment decisions have been related to their level of productivity and digitalisation.

2020). The impact varies across sectors of activity, with the services sector being more likely to report the need to fire staff. This is consistent with other papers which found heterogeneous impact of COVID-19 across sectors of activity (*e.g.*, Benedetti Fasil et al., 2021; Bloom et al., 2021). There is no statistically significant difference with regard to HGEs concerning the need to fire staff after COVID-19.[15]

Table 10: Regression results on the need to fire staff.
Dependent variable: no need to fire staff after COVID-19.

	(1)	(2)	(3)
VARIABLES	No need to fire	No need to fire	No need to fire
HGE dummy			0.005 [0.015]
Small Company	-0.022* [0.012]	-0.020* [0.012]	-0.020* [0.012]
Medium Company	-0.046*** [0.012]	-0.043*** [0.012]	-0.050*** [0.013]
Large Company	-0.068*** [0.015]	-0.063*** [0.015]	-0.067*** [0.016]
Company Age: 2 to 5 years	0.011 [0.074]	0.017 [0.073]	0.063 [0.122]
Company Age: 5 to 10 years	0.013 [0.071]	0.021 [0.071]	0.066 [0.120]
Company Age: 10 to 20 years	0.025 [0.070]	0.031 [0.070]	0.071 [0.119]
Company Age: 20 or more years	0.046 [0.070]	0.049 [0.069]	0.086 [0.119]
Construction Sector	0.063*** [0.012]	yes	yes
Services Sector	-0.049*** [0.011]	yes	yes
Infrastructure Sector	0.072*** [0.012]	yes	yes
Observations	12,556	12,556	11,943
R-squared	0.108	0.126	0.129
Country FE	yes	yes	yes
Country × sector FE	no	yes	yes

Notes: To be precise, the dependent variable is a dummy that takes value 1 if the response "*No and we don't need/intend to take any of these actions*" is given to the following question: "*Thinking about the impact of coronavirus, have you had to put staff temporarily on leave, make staff redundant or unemployed or reduce the number of hours they work compared to before the coronavirus pandemic?*". Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Constant terms included in all regressions but not reported in detail.

[15] Relatedly, further investigations of the category of firms more likely to hire staff despite COVID-19 did not show any significant differences regarding HGEs (results available upon request).

3.3. Post-COVID-19 green and digital transitions

Apart from the development of investment expectations and employment adjustments that have been analyzed in the previous sections, the EIBIS also includes questions that are focused on structural topics. These include questions on the "twin transition" regarding green investments and digital investments. In this following section, we focus on the role of the COVID-19 shock on green and digital transitions that are both important cornerstones for a sustainable economic recovery in the EU.

3.3.1. Digital Transition

EIBIS asks if firms expect COVID-19 to have a long-term impact on the use of digital technologies. HGEs seem to be more likely to consider that COVID-19 will have a long-term impact on the increased use of digital technologies as a response to adjust the firm's business strategy, as shown in Table 11 and Figure 5.

Table 11: Responses regarding whether firms expect the coronavirus outbreak to have a long-term impact on the increased use of digital technologies
(*e.g.* in order to prevent business discontinuity or improve communication with customers, suppliers and employees).

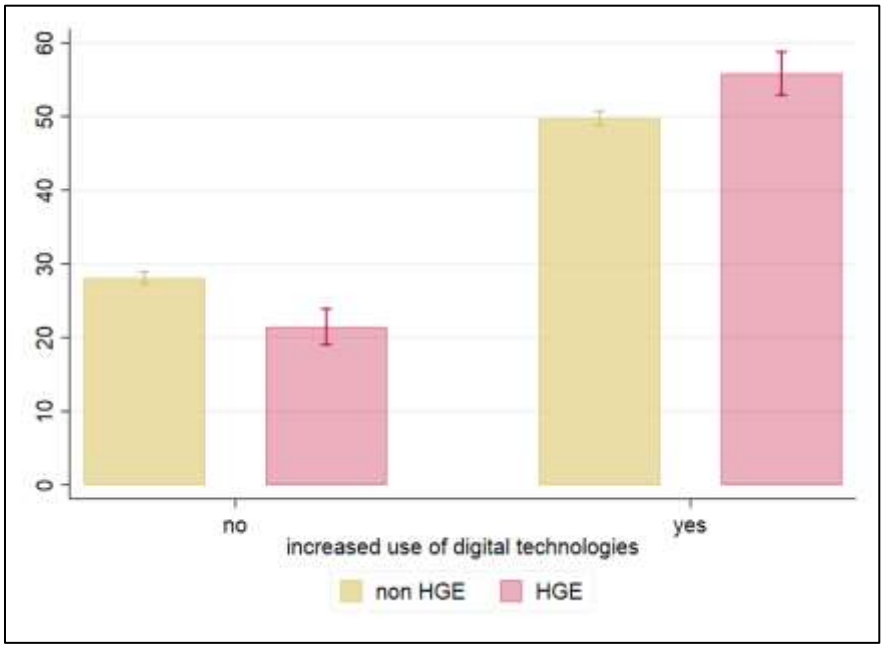
	Is COVID-19 expected to have a long term impact on the use of digital technologies?	
	non-HGEs (%)	HGEs (%)
No	28.1	21.5
Yes	49.8	55.8
None of the above	21.4	21.0

Notes: Responses to the 2020 survey. Value added weights are applied.

Figure 1 emphasizes this advantage of HGEs regarding their response to the COVID-19 shock by boosting their use of digital technologies. While Figure 5 shows that the share of HGEs that expect to increase their use of digital technologies is higher than the share of non-HGEs, this could nevertheless be a sample composition effect rather than a consequence of HGE status. We perform regression analysis to account for other firm characteristics. Our results show that, when controlling for factors such as size, age and sector, HGE status is not statistically significant at conventional significance levels (Table 12).[16]

[16] Table 12 below shows that the HGE dummy is significant at the 11% level, just shy of the 10% level. These results are in line with the analysis of the digitalisation aspirations of high-growth enterprises in Teruel (2021).

Figure 1: Proportion of companies reporting whether they expect COVID-19 to have a long-term impact on the increased use of digital technologies.



Notes: Responses to the 2020 survey. Value added weights are applied.

Table 12: OLS regression results on the expected long-term impact on the increased use of digital technologies. Dependent variable is a dummy for whether firms expect the coronavirus outbreak to have a long-term impact on the increased use of digital technologies.

	(1)	(2)	(3)
HGE dummy			0.029 1.64
Small Company	0.021 1.47	0.020 1.40	0.018 1.21
Medium Company	0.105*** 7.17	0.102*** 6.84	0.099*** 6.39
Large Company	0.193*** 11.23	0.194*** 11.17	0.194*** 10.78
Company Age: 2 to 5 years	-0.058 -0.72	-0.054 -0.67	-0.028 -0.24
Company Age: 5 to 10 years	-0.049 -0.63	-0.045 -0.58	-0.038 -0.33
Company Age: 10 to 20 years	-0.053 -0.69	-0.046 -0.60	-0.038 -0.34
Company Age: 20 or more years	-0.043 -0.57	-0.036 -0.47	-0.028 -0.25
Construction Sector	-0.025* -1.68	Yes	Yes
Services Sector	0.048*** 3.58	Yes	Yes
Infrastructure Sector	0.062*** 4.54	Yes	Yes
Country dummies	yes	yes	yes
Sector x country interaction dummies	no	yes	yes
R2 statistic	0.099	0.109	0.113
Number of obs.	9,249	9,249	8,820

Notes: Responses to the 2020 survey. *** p<0.01, ** p<0.05, * p<0.1. Coefficients and t-statistics are obtained using robust standard errors.

3.3.2. Green Transition

A few questions of the EIBIS focus also on green transition. Respondent firms were asked whether they consider that a transition to a reduction in carbon emissions might have an impact on their business in terms of market demand, supply chain or reputation. Table 13 shows that HGEs seem to have a more positive attitude, in general, towards the impact of the green transition on various business aspects.

HGEs seem to value the positive reputational effects of the green transition more than non-HGEs (43.9% vs. 36.8%). Regarding market demand, more than double the share of firms (HGEs as well as non-HGEs) consider that the transition to a reduction in carbon emissions might have a positive impact compared to a negative impact on market demand (37.1% vs 13.0% for HGEs, and 32.7% vs 15.1% for non-HGEs). HGEs are slightly less likely than non-HGEs to consider that a reduction on carbon emissions will have no impact or a negative impact on market demand (13.0% vs 15.1%) or their reputation (7.4% vs 8.8%). In this sense, HGEs are more optimistic than non-HGEs about the emergence of new business opportunities and the positive reputational impact linked to the challenge of reducing carbon emissions. The supply chain dimension, however, seems more problematic: firms report a negative impact more frequently than a positive impact (27.2% vs 22.5% for HGEs, and 23.9% vs 16.4% for non-HGEs), even though also for this dimension, HGEs are more upbeat about the positive impact than non-HGEs (22.5% vs. 16.4%).

Table 13: Responses regarding the impact of a transition to a reduction in carbon emissions on various business aspects over the next five years.
The three areas are: A. Market demand (for example, change in demand for goods and services due to shift in consumer preferences); B. Your supply chain (for example, it may become easier or more difficult to get the necessary resources for your products or services); C. Your reputation (for example, increase in prestige or stakeholder concerns).

	Market demand (%)		**Supply chain (%)**		**Reputation (%)**	
	non-HGEs	**HGEs**	**non-HGEs**	**HGEs**	**non-HGEs**	**HGEs**
A positive impact	32.7	37.1	16.4	22.5	36.8	43.9
A negative impact	15.1	13.0	23.9	27.2	8.8	7.4
No impact	48.7	45.9	55.9	46.5	51.7	46.3

Notes: Responses to the 2020 survey. Value added weights are applied.

Respondent firms were also asked about investment plans to tackle the impacts of weather events and reduction of carbon emissions. Table 14 provides further evidence on firms' responses to the climate challenge, in particular regarding their investment behaviour. The share of non-HGEs that have already made investments to address extreme weather events and reduce carbon emissions is 45%, compared to 42% for HGEs. Hence, HGEs appear to be lagging slightly in terms of investments made. However, Table 14 also shows that HGEs are more likely to be planning to invest (in the next 3 years) in tackling weather events and reducing carbon emissions (51% of HGEs vs 41% of non-HGEs). This is shown more clearly below in Figure 2. In combination with the implementation of eco-innovations, these planned

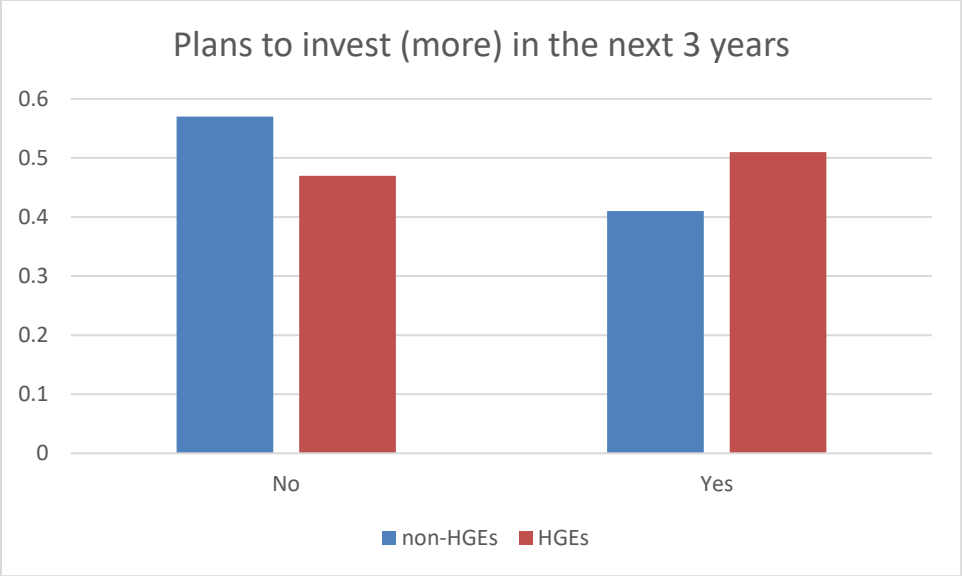
future investments have the potential to spur firm growth and to support the green transition in Europe (Flachenecker et al., 2021).

Table 14: Responses regarding investments to tackle the impacts of weather events and reduction in carbon emissions. Areas covered are: A. Your company has already invested; B. Your company plans to invest (more) in the next 3 years; C. Your company has no investment planned in the next 3 years.

	Already invested (%)		Plans to invest (more) in the next 3 years (%)		No investment planned in the next 3 years (%)	
	non-HGEs	HGEs	non-HGEs	HGEs	non-HGEs	HGEs
No	54	56	57	47	65	67
Yes	45	42	41	51	34	31

Notes: Responses to the 2020 survey. Value added weights are applied. Column totals do not add up to 100% because responses for "Don't Know" and "Refused" are not shown.

Figure 2: Investment plans regarding tackling the impacts of weather events and reduction in carbon emissions.



Notes: Responses to the 2020 survey. Value added weights are applied.

Table 15 below shows regressions results that probe this issue further. After controlling for firm characteristics, HGEs appear to be slightly more likely to make climate-related investments in the next three year (with the HGE dummy being statistically significant at the 10% level). Table 15 also shows that planning climate-related investments in the next three years is increasing in firm size (*i.e.* taking the lowest values for micro firms). However, age does not appear to be related to climate-related investment plans.

Table 15: OLS-LPM regression results on the determinants of whether firms plan to invest more in the next three years regarding investments to tackle the impacts of weather events and reduction in carbon emissions.

	(1)	(2)	(3)
HGE dummy			0.026* 1.68
Small Company	0.046*** 4.18	0.047*** 4.27	0.042*** 3.71
Medium Company	0.115*** 9.64	0.114*** 9.48	0.108*** 8.63
Large Company	0.211*** 14.13	0.214*** 14.15	0.210*** 13.43
2 years to less than 5 years	-0.009 -0.12	-0.017 -0.23	-0.034 -0.29
5 years to less than 10 years	-0.040 -0.54	-0.048 -0.64	-0.080 -0.70
10 years to less than 20 years	-0.060 -0.82	-0.069 -0.94	-0.101 -0.88
20 years or more	-0.047 -0.64	-0.056 -0.75	-0.083 -0.73
Construction Sector	-0.017 -1.43	yes	yes
Services Sector	-0.019 -1.64	yes	yes
Infrastructure Sector	0.040*** 3.40	yes	yes
Country dummies	yes	yes	yes
Sector x country interaction dummies	no	yes	yes
R2 statistic	0.064	0.073	0.076
Number of obs.	12,304	12,304	11,736

Notes: Responses to the 2020 survey. *** p<0.01, ** p<0.05, * p<0.1. Coefficients and t-statistics are obtained using robust standard errors.

4. Conclusions and policy implications

This paper sought to provide a broad perspective on the dynamics of HGEs across various dimensions after the onset of the COVID-19 crisis, by showing novel results from the EIBIS 2020 survey wave. There are concerns that HGEs, who are considered to be a vulnerable group of firms during good times, might be especially vulnerable during the 'bad times' that correspond to the COVID-19 crisis.

Overall, the picture that emerges shows that HGEs (*i.e.*, firms that were HGEs up until the time of the COVID-19 shock) have indeed been adversely affected by the COVID-19 shock. HGEs and non-HGEs are overall similar, although some small differences can be observed that generally lean in the direction of suggesting that HGEs are slightly *less* vulnerable than non-HGEs to the COVID-19 shock. Summarizing our main results stemming from descriptive statistics and regressions, it appears that:

- HGEs saw their expectations regarding investment drop from 2019 to 2020, but so did non-HGEs. HGEs actually are more likely than non-HGEs to invest in 2019 as well as in 2020.
- Expectations regarding the availability of internal finance (and to a lesser extent for external finance) have decreased quite dramatically from 2019 to 2020, although HGEs remain more optimistic than non-HGEs.
- Expectations regarding their sector's business prospects have decreased for HGEs, but – again – they have better expectations than non-HGEs.
- HGEs are more likely to have no investment planned in 2020 (compared to HGEs in 2019), and slightly less likely to invest in developing or introducing new products, processes or services, but – again – they still score higher than non-HGEs in terms of expected investment.
- Focusing specifically on changes in investment that are tied to COVID-19, HGEs are adversely affected overall, but are less likely to expect to invest less due to COVID-19, and more likely to invest more due to COVID-19 compared to non-HGEs.
- HGEs report that they are likely to delay investment plans due to COVID-19, but again the proportion of such HGEs is slightly lower than the corresponding share for non-HGEs.
- HGEs are likely to put staff temporarily on leave, make staff redundant or unemployed, or reduce the number of hours worked, compared to before COVID-19 - but again, non-HGEs do comparatively slightly worse than HGEs.
- HGEs may be more likely than non-HGEs to expect COVID-19 to have a long-term impact on the increased use of digital technologies (although the coefficient is not statistically significant).
- HGEs are more likely than non-HGEs to see the challenges of climate change as sources of new business opportunities.

Overall, we do not find any clear evidence that HGEs are more vulnerable than non-HGEs. If anything, they seem to be slightly more optimistic to COVID-19-related challenges than non-HGEs.

More generally, our discussion of how HGEs are faring in 2020 crucially depends on the comparison group. In good times, HGEs appear to enjoy a "premium" whereby they invest far more than non-HGEs. In bad times however, *i.e.,* as exemplified by the outbreak of the COVID-19 pandemic, this premium starts to fade. HGEs remain more active investors than non-HGEs, but compared to HGEs from previous periods they have experienced disproportionately large drops in investment activity. In this sense, the COVID-19 crisis seems to have affected HGEs quite strongly. A complementary perspective on HGE investment during the COVID-19 shock should therefore take a time-series approach and compare HGEs in 2020 with HGEs in previous years (see for example the difference-in-difference analysis in Coad et al, 2021). With regards to policy recommendations, the observation that HGE outcomes are at least as good as non-HGE outcomes should be considered alongside observations that HGE investment expectations in 2020 are rather poor compared to HGE investment expectations in previous years.

Overall, our results suggest that High-Growth Enterprises can play a useful role in stimulating economic dynamism and reallocation, as EU member states recover from the worst effects of the COVID-19 shock. From a policy perspective, the plummeting expectations regarding the availability of internal and external finance highlight the importance of the large-scale public support programmes that have been implemented after the outbreak of the COVID-19 crisis in Europe to mitigate liquidity and solvency risks. These support measures should also take into account the specific financing needs of HGEs (Benedetti-Fasil et al, 2021) which would help this type of firm *e.g.* to realize their investment and growth plans. Our results also point to the important role that HGEs play in supporting the green and digital transition. In this regard, the recovery instrument NextGenerationEU with the newly established Recovery and Resilience Facility (RRF) as its centerpiece provides not only a strong impetus for a sustainable recovery of European Member states after the initial COVID-19 shock, but also for the twin transition due to having a sizeable amount of investments and reforms specifically earmarked for digital and green components. Both of these elements will support new and potential HGEs, for instance by enabling their green investment ambitions, or by creating better framework conditions and opening up new business opportunities. The digital acceleration induced by the COVID-19 pandemic is already felt across the economy, albeit to varying degrees (Teruel et al, 2021a). Policy can further facilitate the uptake of digital technologies that would enable firms also to internationalize and to scale their business models (Teruel et al, 2021b), as well as more generally facilitate market access and integration. Given the crucial role of HGEs in the economy, it is worth thinking carefully about how HGEs can be supported through these testing times and beyond.

Some limitations of our approach should be mentioned. This paper is intended to provide a first overview of the potential impact of COVID-19 on HGEs and has focused on presenting descriptive statistics, graphs, and some selected regressions. While our survey data are rich in terms of variables and countries covered, nevertheless the country sample sizes are too small to draw conclusions at the country level. We cannot rule out the counterfactual scenario that HGEs would have performed disproportionately better had COVID-19 not occurred, therefore, in this sense, we cannot rule out that HGEs would normally perform far better than what they were able to do after being hit by the COVID-19 shock. Such counterfactual evidence, that is so important for policymakers, would require more sophisticated econometric analysis using panel data and empirical frameworks for causal inference (some attempts are in Coad et al., 2021). As such, our regression results depict correlations, and do not allow to draw causal interpretations. Future work could also investigate if the differences we observe between HGEs and non-HGEs (*e.g.* that HGEs are better positioned for climate change) are driven by omitted variables and potential endogeneity. Future work could also investigate whether the expected (ex-ante) changes in behavior are also reflected in (ex-post) data, which will be possible once this data become available. More research on these topics is clearly needed.

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List of abbreviations and definitions

COVID-19	Coronavirus disease 2019
EIB	European Investment Bank
EIBIS	European Investment Bank Investment Survey
HGE	High growth enterprise
Non-HGE	Non High growth enterprise
R&D	Research & Development
RRPs	Recovery and Resilience Plans

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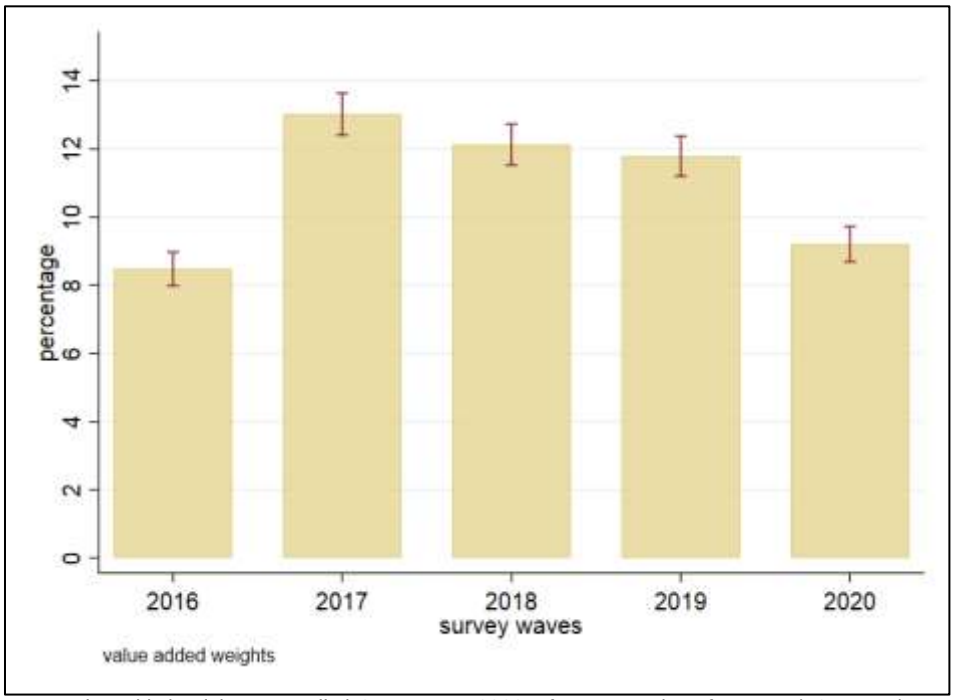
Appendix A: Basic results for HGEs

A.1 HGE across waves in the survey

Figure A.1 and Table A.1 show the proportion of HGEs for the surveys performed yearly from 2016 until 2020. The proportion of HGEs generally fluctuates at around 10%, with relatively few HGEs in the survey waves of 2016 and 2020.

The number of HGEs is relatively low in 2020, but (as explained earlier) this cannot be explained by the COVID-19 shock, because the HGE variable is calculated in the 2020 wave using information on employees in the periods preceding the COVID-19 crisis. Instead, the relatively low number of HGEs in 2020 seems to be due to unexplained macroeconomic factors and we do not investigate this in depth.[17] The total number of respondent firms tends to be stable and it is between 11,500 and 12,000.

Appendix Figure A.1: Share of HGEs across survey waves



Notes: Value Added weights are applied. Survey wave 2020 refers to growth performance (HGE status) over the period 2016-2019, and a similar lag affects previous survey waves.

[17] Given that the HGEs in the 2020 survey wave are fewer in number, this could be signal that they are of "higher quality", if marginal firms on the borderline of inclusion in the HGE category are eventually not included in the HGE category. This could be kept in mind when interpreting our results for HGEs.

Appendix Table A.1: number of HGEs, and shares of HGEs across EIBIS waves (without and with VA weights)

	Without VA weights				VA weights			
wave	N	Share of HGEs	# HGEs	# Non-HGEs	N	Share of HGEs	#HGEs	# Non-HGEs
2016	12162	7.6%	922	11240	12149	8.5%	1030	11119
2017	11513	11.6%	1340	10173	11450	13.0%	1491	9959
2018	11531	10.8%	1241	10290	11378	12.1%	1380	9998
2019	11814	11.1%	1316	10498	11683	11.8%	1377	10306
2020	11957	9.4%	1118	10839	11836	9.2%	1090	10746
Total	58977	10.1%	5937	53040	58496	10.9%	6368	52128

A.2 Determinants of HGEs

We may also be interested in the possible determinants of HGEs, i.e., which broad firm characteristics are more likely to be associated with HGEs. We therefore estimate a simple regression equation for firm *i* at time *t*:

$$HGE_{it} = \alpha + \beta_1 size_{it} + \beta_2 age_{it} + \beta_3 sector_{it} + \beta_4 other\_controls_{it} + \varepsilon_{it}$$

Control variables include:

- Firm size: with respect to their size, companies can be micro, small, medium or large. Micro companies are the (omitted) baseline reference case.
- Firm age: companies can be less than 2 years, from 2 to 5 years, from 5 to 10 years, from 10 to 20 years, or more than 20 years. The baseline is firms less than 2 years old.
- Sectors of activity can be construction, services, infrastructure or manufacturing. The baseline is manufacturing.

Appendix Table A.2 shows the regression results for the determinants of HGEs using OLS regressions[18] that include some basic explanatory variables, as described above. Column (1) includes country dummies, and column (2) includes not only country dummies, but also sector × country interaction dummies. HGEs are less likely to be micro firms (the omitted baseline reference category), and more likely to be in either the medium-sized or large-sized categories (the coefficients for these latter two groups are not statistically significantly different from each other). HGEs are less likely to be found among firms aged above 20 years, which is in line with previous studies (Haltiwanger et al., 2013; Coad et al., 2018). Controlling for other factors such as firm size and firm age, HGEs seem to be more common in the construction sector and, to a lesser degree, in the infrastructure sector.

[18] Our regressions often apply OLS-LPM models (Ordinary Least Squares – Linear Probability Model) even if the dependent variable is binary, because OLS-LPM has the advantage of having coefficient estimates that are relatively easy to interpret in terms of marginal effects (Angrist and Pischke, 2008).

Appendix Table A.2: Determinants of HGEs. OLS-LPM (linear probability model) regressions, with HGE dummy as dependent variable.

	(1)	(2)
VARIABLES	DV: HGE	DV: HGE
Small Company	0.120***	0.121***
	[0.00238]	[0.00240]
Medium Company	0.167***	0.167***
	[0.00298]	[0.00301]
Large Company	0.162***	0.160***
	[0.00387]	[0.00392]
Company Age: 2 to 5 years	0.0260	0.0285
	[0.0286]	[0.0286]
Company Age: 5 to 10 years	0.0387	0.0412
	[0.0280]	[0.0280]
Company Age: 10 to 20 years	-0.00980	-0.00810
	[0.0278]	[0.0278]
Company Age: 20 or more years	-0.0749***	-0.0726***
	[0.0277]	[0.0277]
Construction Sector	0.0237***	yes
	[0.00370]	
Services Sector	-0.00291	yes
	[0.00326]	
Infrastructure Sector	0.00661*	yes
	[0.00348]	
Year dummies	yes	yes
Country dummies	yes	yes
Sector x country interaction dummies	no	yes
Observations	58,902	58,902
R-squared	0.056	0.059

Notes: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Constant term included in all regressions but not reported here in detail. When sector x country interaction dummies are included, we denote the individual sector dummies by "yes" rather than reporting their coefficients, to avoid confusion (because the overall interpretation of sector dummies depends on the coefficients for sector dummies taken individually as well as their interactions with country dummies).

Appendix B: investment barriers

Appendix Table B.1: Barriers to investment activities in general.

	Non-HGEs				HGEs			
	2019		2020		2019		2020	
Demand for prod/serv.								
A major obstacle	2,083	*19.0%*	2,644	*23.3%*	243	*17.6%*	239	*20.3%*
A minor obstacle	3,450	*31.5%*	3,464	*30.5%*	436	*31.6%*	360	*30.6%*
Not an obstacle at al	5,433	*49.5%*	5,262	*46.3%*	702	*50.8%*	578	*49.1%*
total	10,966	*100.0%*	11,370	*100.0%*	1,381	*100.0%*	1,177	*100.0%*
Skilled staff								
A major obstacle	5,664	*51.1%*	4,851	*42.3%*	756	*54.2%*	546	*46.0%*
A minor obstacle	3,042	*27.5%*	3,626	*31.6%*	406	*29.1%*	397	*33.5%*
Not an obstacle at al	2,368	*21.4%*	2,987	*26.1%*	233	*16.7%*	243	*20.5%*
total	11,074	*100.0%*	11,464	*100.0%*	1,395	*100.0%*	1,186	*100.0%*
Energy costs								
A major obstacle	2,856	*25.9%*	2,378	*20.8%*	346	*24.9%*	222	*18.8%*
A minor obstacle	3,904	*35.4%*	3,952	*34.6%*	495	*35.7%*	425	*35.9%*
Not an obstacle at al	4,260	*38.7%*	5,095	*44.6%*	547	*39.4%*	536	*45.3%*
total	11,020	*100.0%*	11,425	*100.0%*	1,388	*100.0%*	1,183	*100.0%*
Access to digital infrastr.								
A major obstacle	965	*8.8%*	1,036	*9.1%*	140	*10.1%*	103	*8.7%*
A minor obstacle	3,256	*29.6%*	3,153	*27.6%*	439	*31.7%*	358	*30.3%*
Not an obstacle at al	6,771	*61.6%*	7,224	*63.3%*	806	*58.2%*	721	*61.0%*
total	10,992	*100.0%*	11,413	*100.0%*	1,385	*100.0%*	1,182	*100.0%*
Labour mkt reguln								
A major obstacle	2,916	*26.5%*	2,846	*25.0%*	424	*30.6%*	311	*26.4%*
A minor obstacle	3,928	*35.8%*	3,914	*34.4%*	483	*34.9%*	424	*36.0%*
Not an obstacle at al	4,142	*37.7%*	4,614	*40.6%*	477	*34.5%*	442	*37.6%*
total	10,986	*100.0%*	11,374	*100.0%*	1,384	*100.0%*	1,177	*100.0%*

(Note: Continued next page)

Appendix Table B.1: Barriers to investment activities in general (cont.)

Bus. regulns/tax								
A major obstacle	3,336	*30.3%*	3,137	*27.6%*	410	*29.5%*	352	*29.8%*
A minor obstacle	3,718	*33.8%*	3,931	*34.5%*	482	*34.7%*	405	*34.3%*
Not an obstacle at al	3,951	*35.9%*	4,317	*37.9%*	496	*35.7%*	423	*35.8%*
total	11,005	*100.0%*	11,385	*100.0%*	1,388	*100.0%*	1,180	*100.0%*
Transport infrastr.								
A major obstacle	1,534	*14.0%*	1,389	*12.2%*	230	*16.6%*	169	*14.3%*
A minor obstacle	3,232	*29.4%*	3,004	*26.3%*	414	*29.9%*	324	*27.4%*
Not an obstacle at al	6,217	*56.6%*	7,011	*61.5%*	739	*53.4%*	691	*58.4%*
total	10,983	*100.0%*	11,404	*100.0%*	1,383	*100.0%*	1,184	*100.0%*
Available finance								
A major obstacle	2,018	*18.4%*	2,265	*20.0%*	258	*18.6%*	239	*20.3%*
A minor obstacle	3,100	*28.3%*	3,341	*29.4%*	413	*29.8%*	346	*29.4%*
Not an obstacle at al	5,828	*53.2%*	5,746	*50.6%*	714	*51.6%*	593	*50.3%*
total	10,946	*100.0%*	11,352	*100.0%*	1,385	*100.0%*	1,178	*100.0%*
Uncertainty future								
A major obstacle	3,947	*36.0%*	5,502	*48.4%*	460	*33.3%*	548	*46.5%*
A minor obstacle	4,225	*38.5%*	3,838	*33.8%*	563	*40.7%*	409	*34.7%*
Not an obstacle at al	2,803	*25.5%*	2,022	*17.8%*	360	*26.0%*	221	*18.8%*
total	10,975	*100.0%*	11,362	*100.0%*	1,383	*100.0%*	1,178	*100.0%*

Notes: column totals calculated after dropping "Refused" and "Don't know."

Appendix C: HGEs per country group

Appendix Table C.1: Non-HGEs and HGEs per country group

	Year	North-West	Center and East	South	All
Non-HGEs	2016	4220	4336	2155	10711
	2017	3791	3890	2025	9706
	2018	3806	3974	2050	9830
	2019	3973	4034	2043	10050
	2020	4059	4185	2104	10348
HGEs	2016	325	406	141	872
	2017	509	518	232	1259
	2018	450	465	248	1163
	2019	472	493	271	1236
	2020	413	382	259	1054
% HGEs	2016	7.2%	8.6%	6.1%	7.5%
	2017	11.8%	11.8%	10.3%	11.5%
	2018	10.6%	10.5%	10.8%	10.6%
	2019	10.6%	10.9%	11.7%	11.0%
	2020	9.2%	8.4%	11.0%	9.2%

Appendix D: Sector disaggregation

The following graphs show a disaggregation of the responses to the 2020 survey wave. Sectors with fewer than 20 observations are omitted. On the left side, in each of the following graphs, the magnitude of the sales decline in 2020 is shown using grey bars, to highlight the vulnerability of each sector. Sectors are ordered according to the average sales loss across countries for each sector.

Figure D.1: Shares of HGEs across sectors

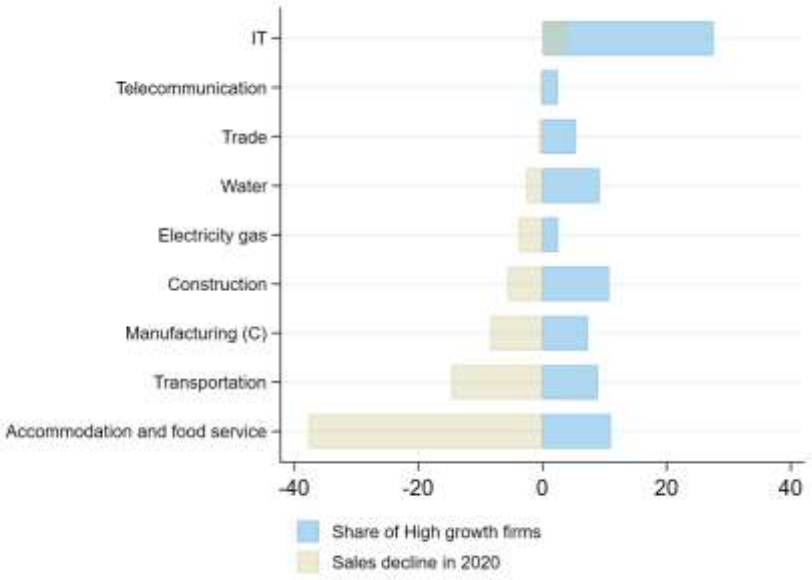


Figure D.2: Expected increase in investment spending across sectors

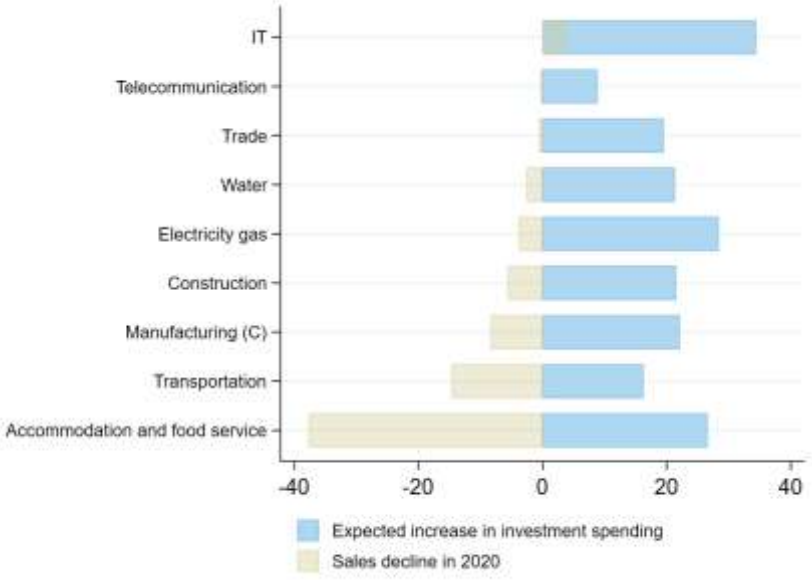


Figure D.3: Expected decrease in investment spending across sectors

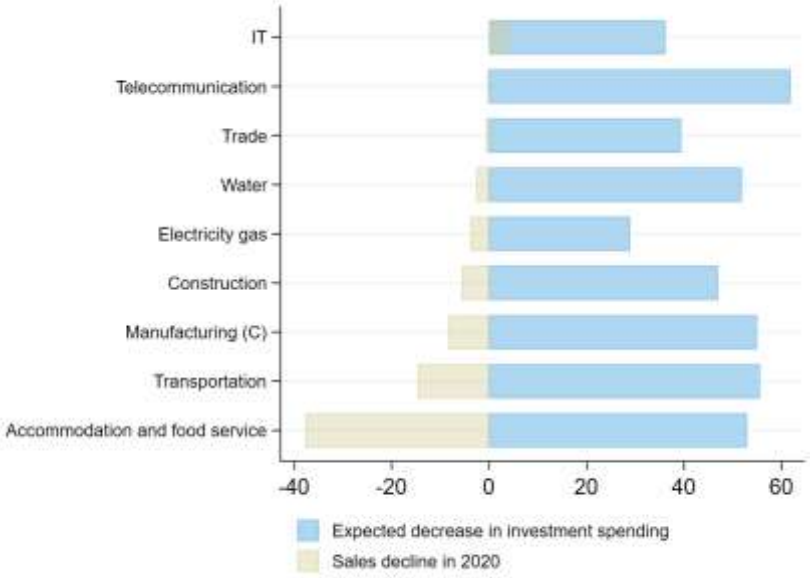


Figure D.4: Expected deterioration of internal finance across sectors

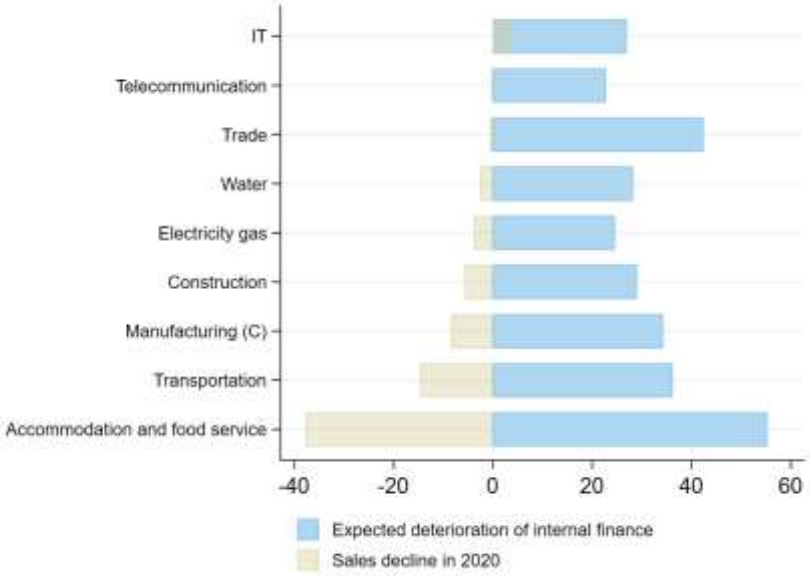


Figure D.5: Expected improvement in internal finance across sectors

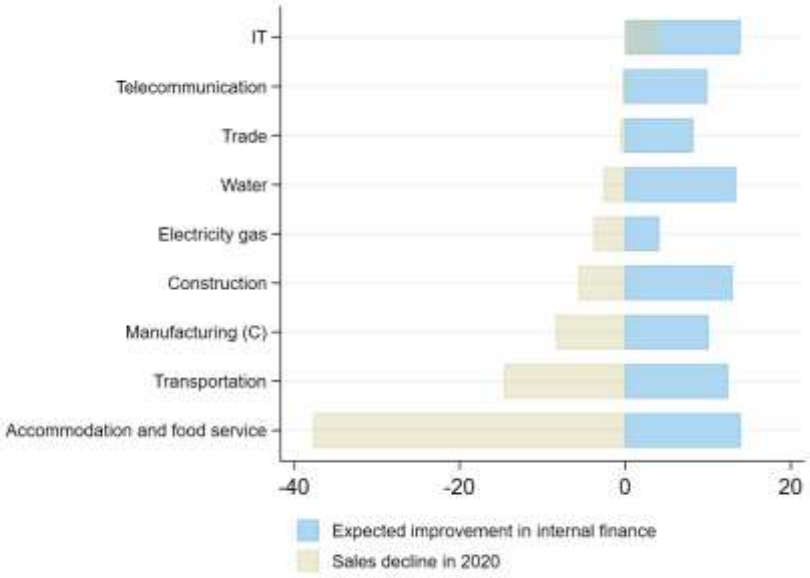


Figure D.6: Expected deterioration of external finance across sectors

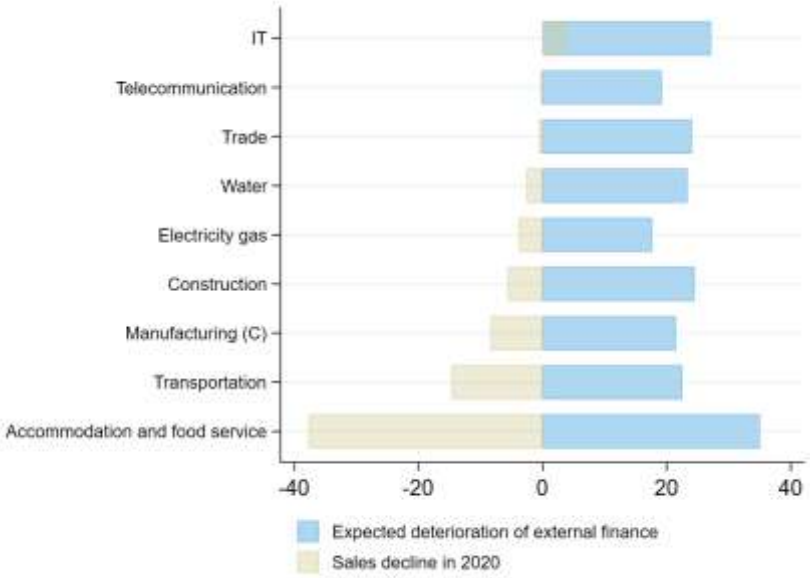


Figure D.7: Expected improvement in external finance across sectors

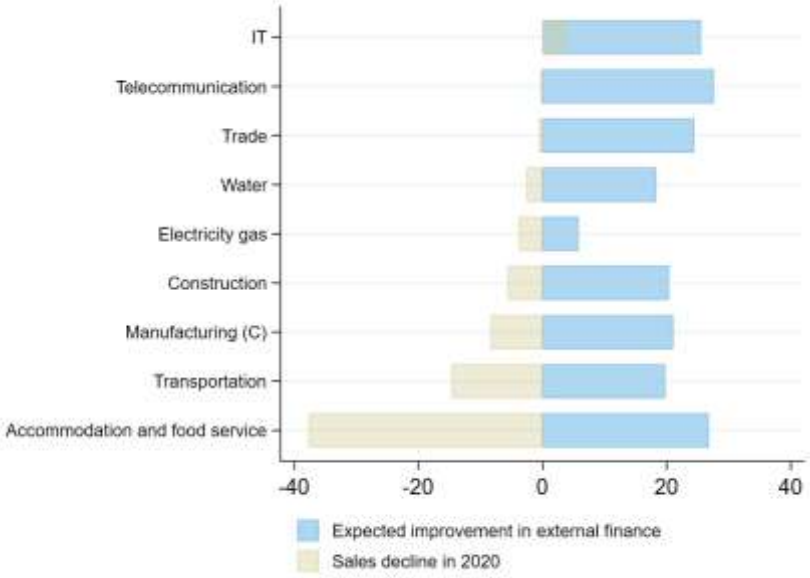


Figure D.8: Replacing capacity as an investment priority: responses across sectors

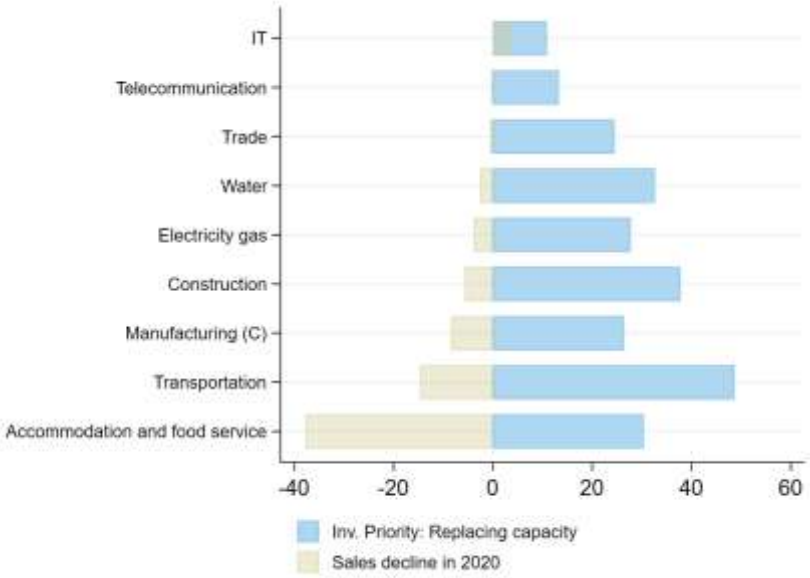


Figure D.9: Capacity expansion as an investment priority: responses across sectors

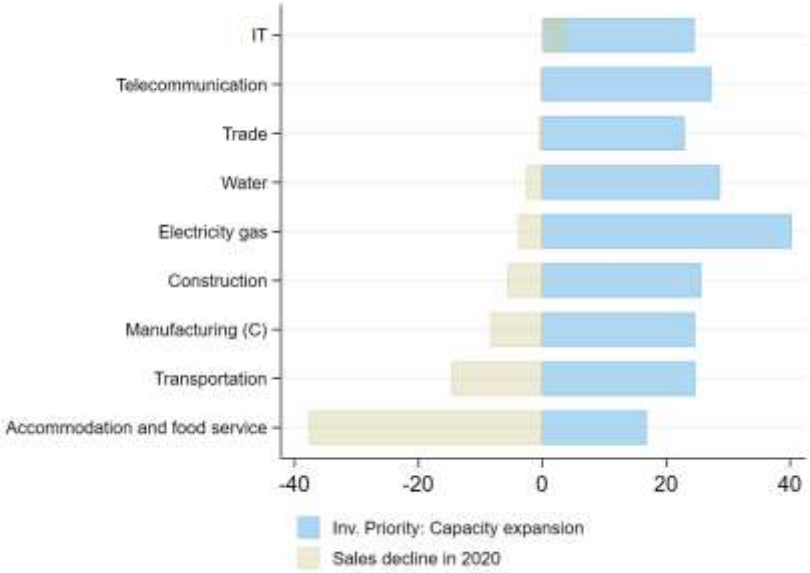
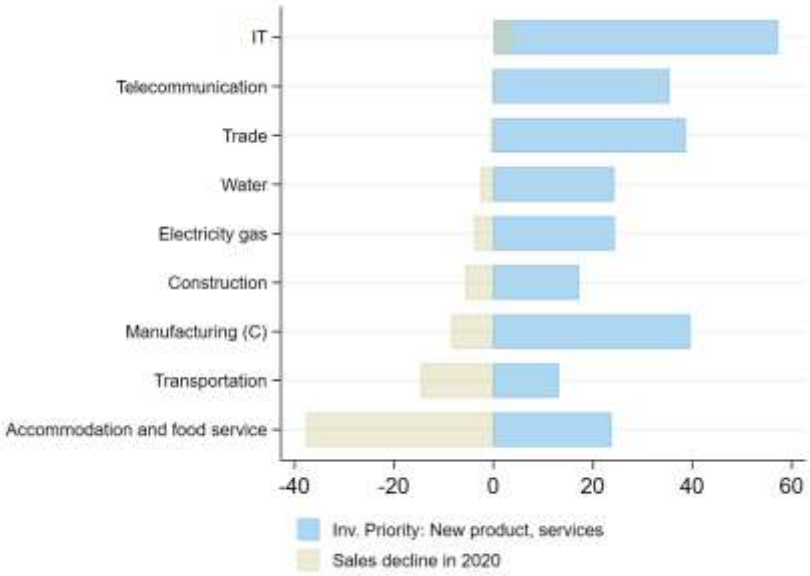


Figure D.10: New products and services as an investment priority: responses across sectors

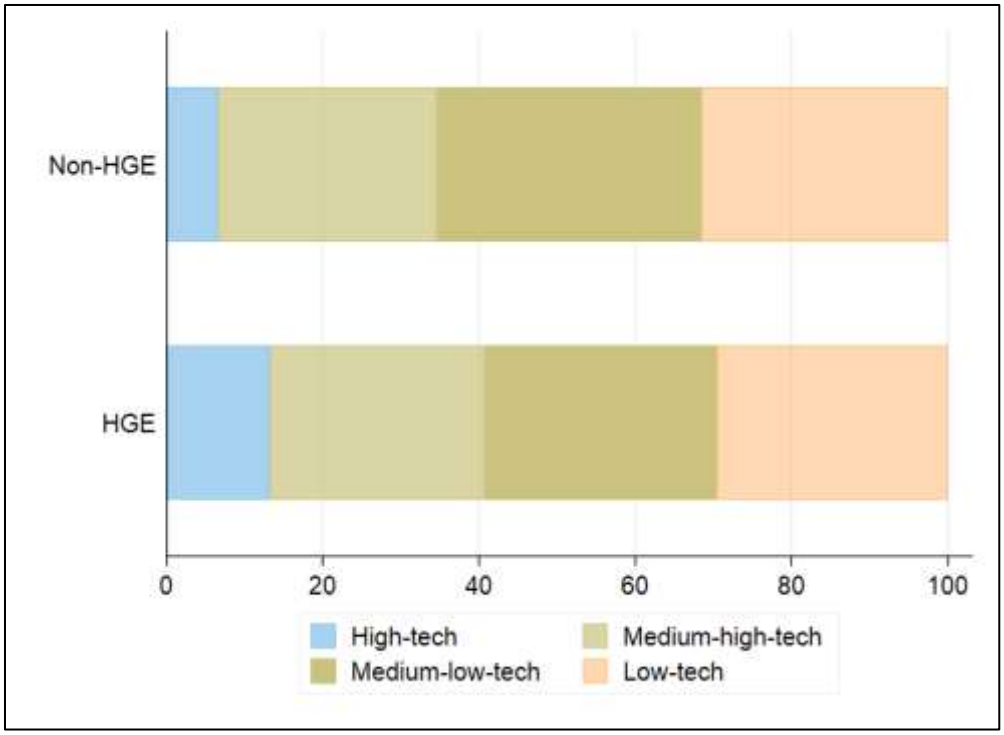


Appendix E: HGEs across technology-related macrosectors

Respondent firms are also asked to identify their macro-sector of activity which allows us to distinguish between high-tech, medium-high-tech, medium-low-tech and low-tech firms. HGEs are found in all sectors, although they appear to be relatively more common in high-tech sectors (17.1% of our sample, compared to 9% or below for other sectors). However, this observation should be interpreted with caution, given that previous research has suggested that high-growth firms are less common in high-tech sectors (Henrekson and Johansson, 2010), and in particular HGEs are less common in R&D-intensive sectors (Daunfeldt et al., 2016), although HGEs seem to be more common in knowledge-intensive service industries (Daunfeldt et al., 2016; Ferrando et al., 2019). Venture Capital recipients, however, are a certain type of high-potential firm that are often more numerous in high-tech sectors (Flachenecker et al., 2020).

Figure E.1 considers the proportions of HGEs and non-HGEs across broad industry categories: high-tech, medium-high-tech, medium-low-tech and low-tech. In our sample, the proportion of high-tech firms among HGEs is greater than the proportion of high-tech firms among non-HGEs. Non-HGEs are more common in the medium-low-tech or low-tech macro-sectors, while being about as frequently observed in the medium-high-tech sector.

Figure E.1: Proportions of HGEs and non-HGEs across broad sectors (in %)



Notes: Value Added weights are applied.

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