Productivity and HGEs: resilience and potential recovery from Covid-19 pandemic

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1. Motivation

- **Covid-19 pandemic caused the halt of the economic activity** during a short period of time and an **acceleration of firm's digitalisation**.

- In this context, it is necessary to define:
  - the path of the European recovery
  - the digital transformation among companies

- <u>**Aim:**</u> Analysis **of how productive firms and HGEs were affected in the short term and long term in terms of reduction of employment and also their digitalisation**.

- <u>**Contributions**</u>:
  - We show evidence on the **positive relationship between productivity and lower employment reduction** in the short and long term
  - We observe that **innovative HGEs do not expect to reduce their employment**.
  - **Covid-19 pandemic may accelerate the digitalization but also the digital gap between companies**

2. Literature review

2.1. The effect of Covid-19 on employment

- Leader and laggard firms present different characteristics (Coad, 2011)

Laggard	Leader
• Steep hierarchy • Improve the efficiency rather than grow • Invest in advanced projects • Learn from possible failures of leaders	• Flat hierarchies • Aim to grow • More innovative • Smaller

➢ **Less productive firms may be more likely to reduce their employment in the short and long term during the COVID-19 crisis.**

- Similarly, HGEs are usually small young and they have greater financial needs since they suffer trigger points that require investments to adjust their path of growth (Coad et al., 2021).

➢ **HGEs may be more likely to reduce their employment in the short and long term during the COVID-19 crisis.**

2. Literature review

2.2. The effect of Covid-19 on new digital technologies

- During crises, firms have incentives to accelerate their technological transformation, there is a larger need of digital technologies across all firms' processes (Hershbein and Kahn, 2018).

  - **More digitalised firms and firms in more digitalized sectors might be less likely to reduce the employment in the short and long term due to the COVID-19 shock**

- COVID-19 pandemic obliges firms to redefine their strategy (Pantano et al., 2020; Ebersberger and Kuckertz, 2021) and it is interesting to understand if this change is going to persist into the future (Apedo-Amah et al., 2020).

  - **HGEs and more productive firms are more prone to continue adoption of NDTs due to the COVID-19 pandemic.**

- As stated by Ferrando et al. (2019), this may be due to the fact that both groups of firms differ in their capacity to technologically innovate but also in their success of combining diverse intangibles.

3. Database

EIBIS dataset

- Representative across all 27 Member States of the EU and UK.
- Four firm size classes (micro, small, medium, and large).
- Four sector groupings (manufacturing, services, construction, and infrastructure).
- 4 waves (2017-2020) with 12,000 firms participating in multiple waves.

BvD ORBIS database

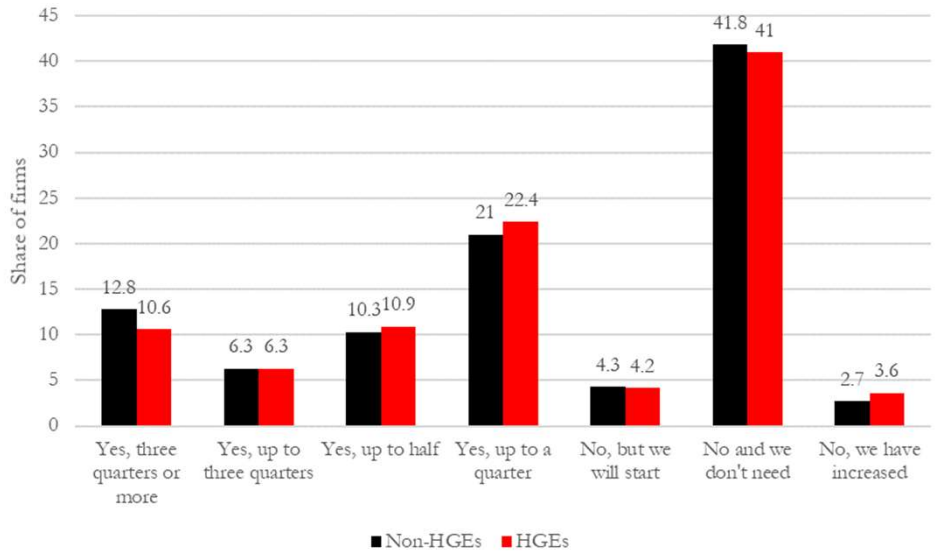
- Accounting information.
- Period 2016 – 2020

Definition of key variables

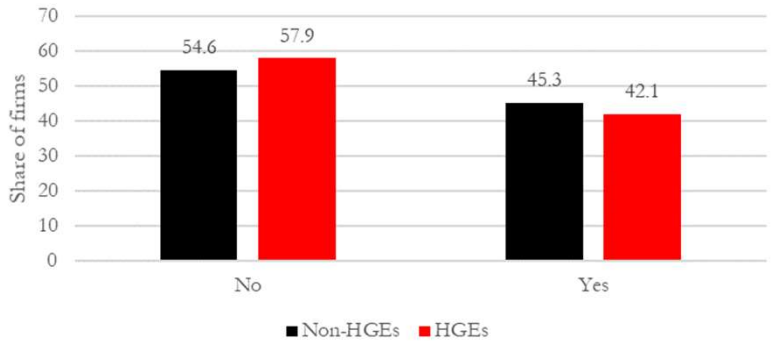
- **HGEs**: Dummy identifying firms with cumulative 3-year growth of more than 33%, which would correspond to an annual growth rate of 10%.
- **Productivity**: value added for worker.

Descriptive statistics -Covid-19 and employment changes

Incidence of employment reduction in the short-term due to the Covid-19

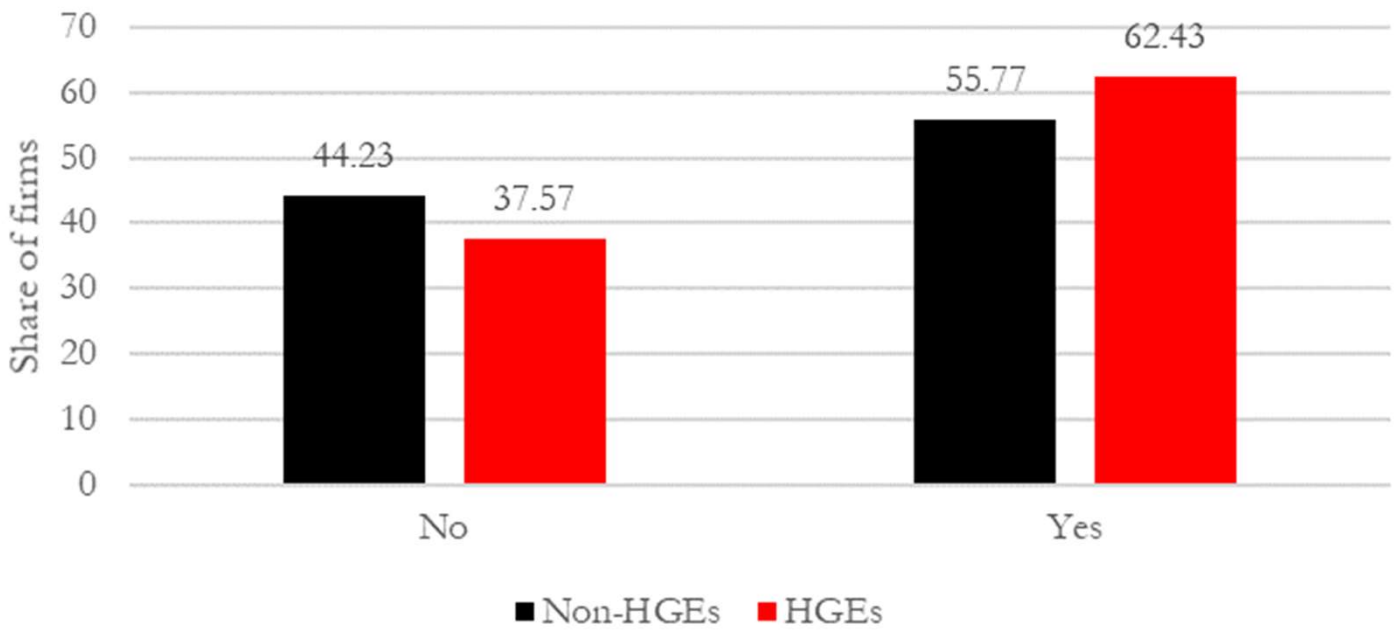


Incidence of expected employment reduction in the long-term due to the Covid-19



Descriptive statistics- Covid-19 and changes in digitalisation

Expected occurrence of digital increase due to the Covid-19



4. Econometrics

Probability of the impact on employment and digitalisation => Probit with robust standard errors

$$Prob(impact)_{i,t} = \alpha_{31} + \beta_{31}\ HGE_{it-}\ + \beta_{32} LabProd_{it-1} + \cdots + \ Digit_{it-1}\beta_{33} + \epsilon_{3i,t}$$

Definition of key dependent variables:

a) **Short-term impact on employment** ⇒ High vs low impact, low impact vs. not change, growing vs. not impact.

b) **Expected probability that Covid-19 will have a long-term impact on the reduction of employment**

c) **Expected probability that Covid-19 will have a long-term impact on the digitalisation**

Definition of key independent variables:

a) ***HGE***: Dummy identifying firms with cumulative 3-year growth of more than 33%, which would correspond to an annual growth rate of 10%.

b) ***LabProd***: value added for worker (logs).

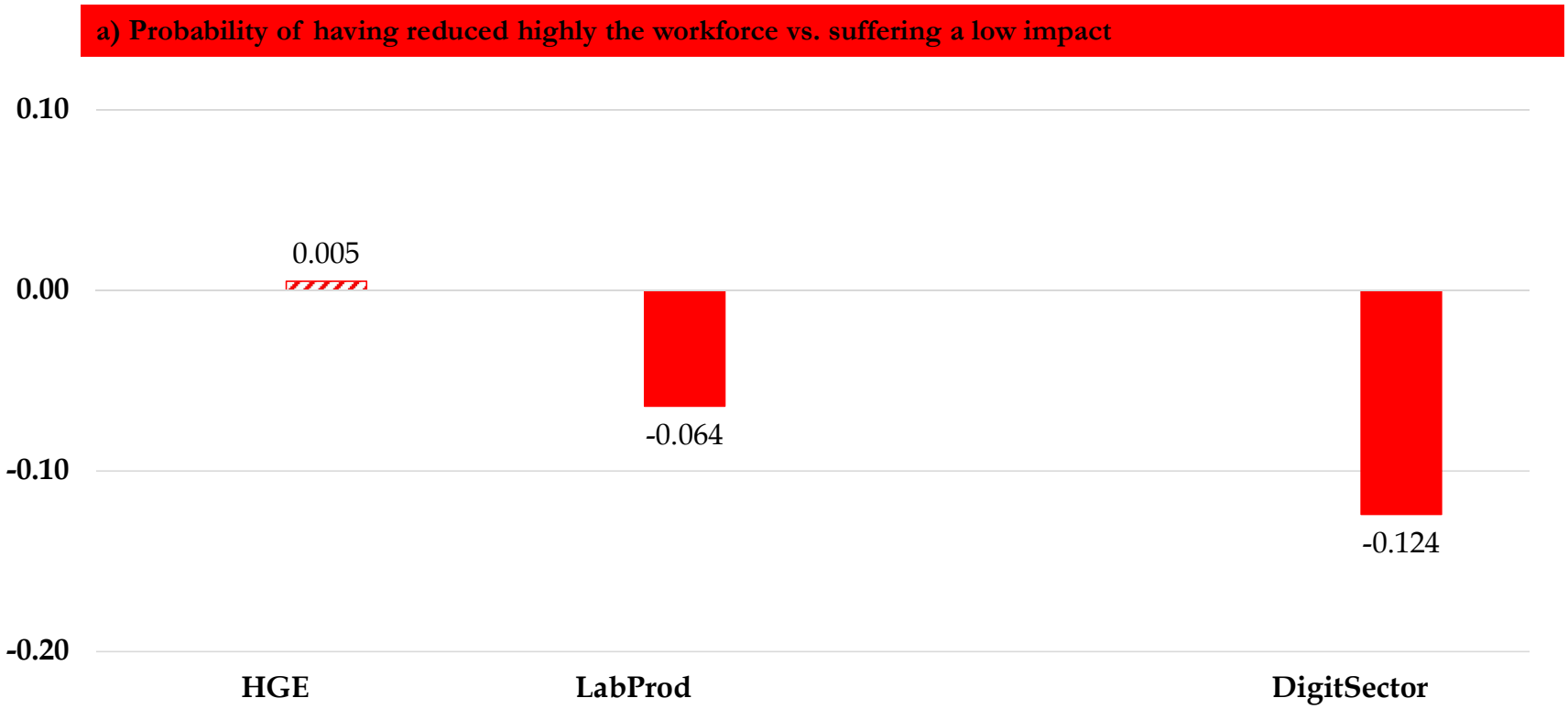
c) ***Digit*** ⇒ ***DigitSector***: Dummy identifying sectors with a mean expenditure in digitalisation larger than the total average.

⇒ ***Partial*** *and* ***Full digital level***: Dummy equal to 1 if the firm has adopted partially or fully NDTs

5. Results

5.1. Short-term impact on employment

Graph 1. Estimated coefficients of the effect of being a HGE (*HGE*), labour productivity (*LabProd*) and digitalised sector (*DigitSector*).
Note: Independent variables refer to year 2019 while impact refers to early 2020. Diagonal bars represent non-significant coefficients.



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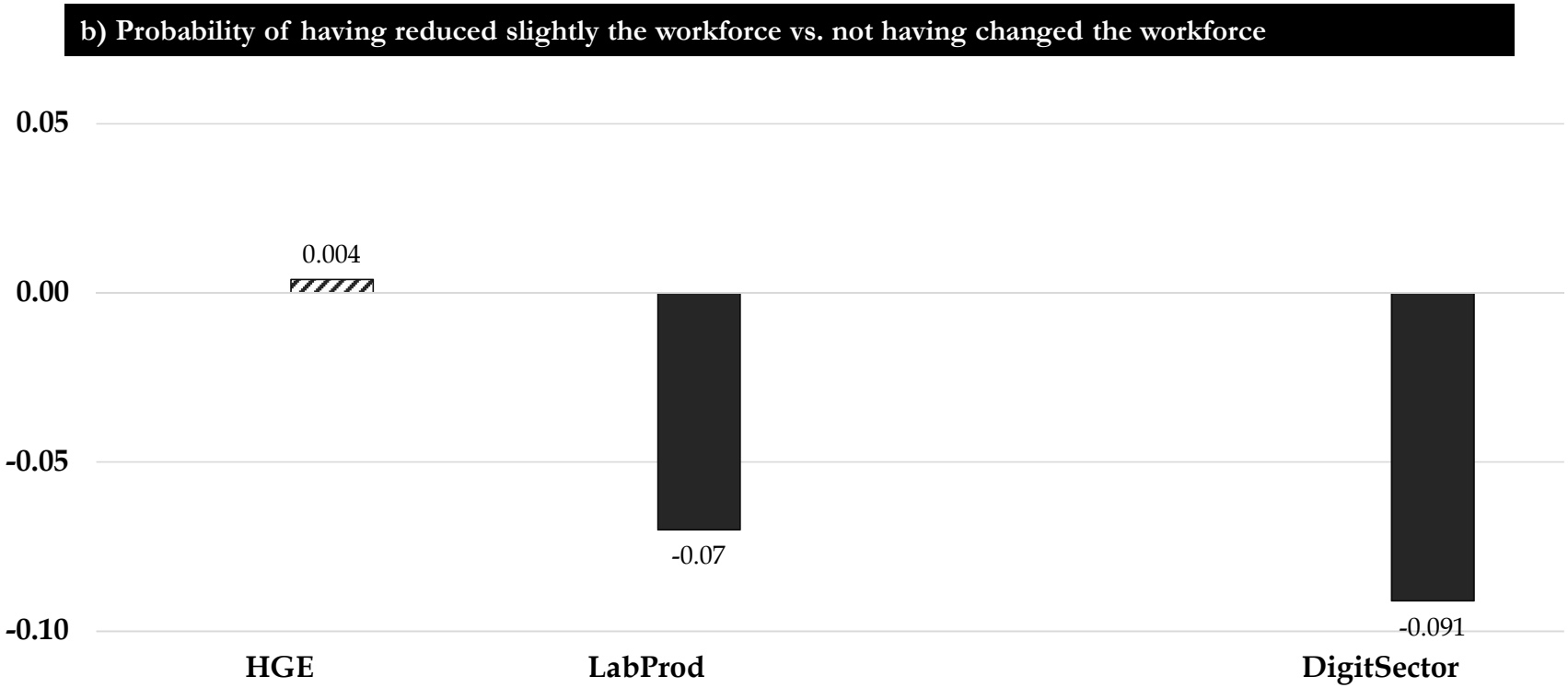

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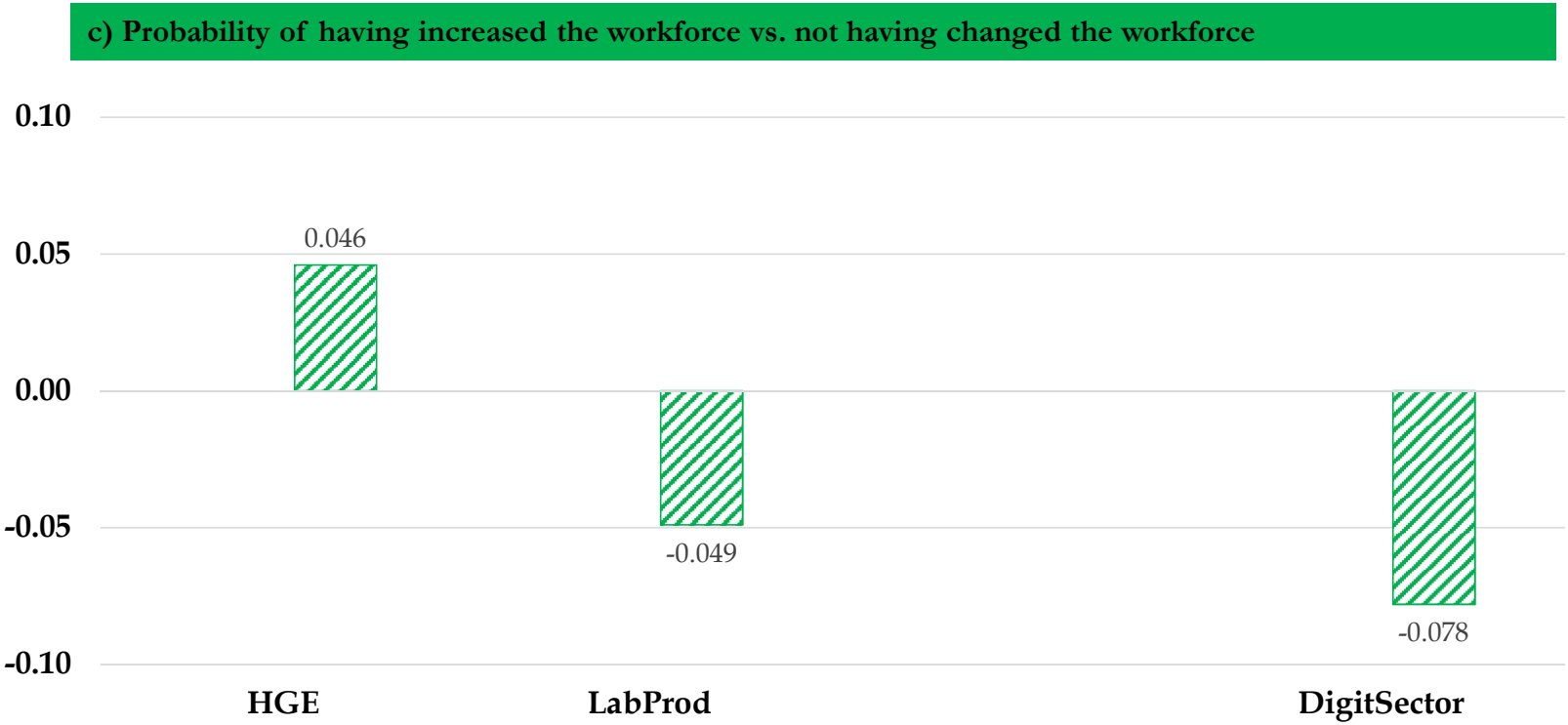
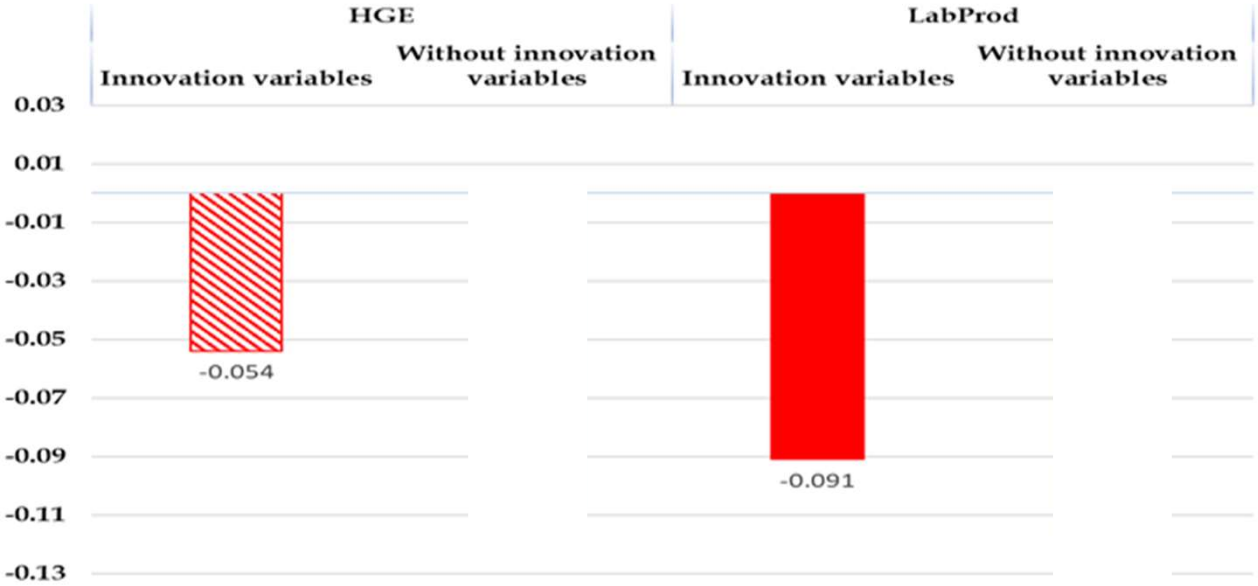


5. Results

5.2. Long-term impact on employment

Graph 2. Estimated coefficients of the effect of being a HGE (*HGE*) and labour productivity (*LabProd*). Dependent variable probability of reducing permanently the workforce due to Covid-19 pandemic. *Note: Independent variables refer to year 2019 while impact refers to long-term after 2020. Diagonal bars represent non-significant coefficients.*



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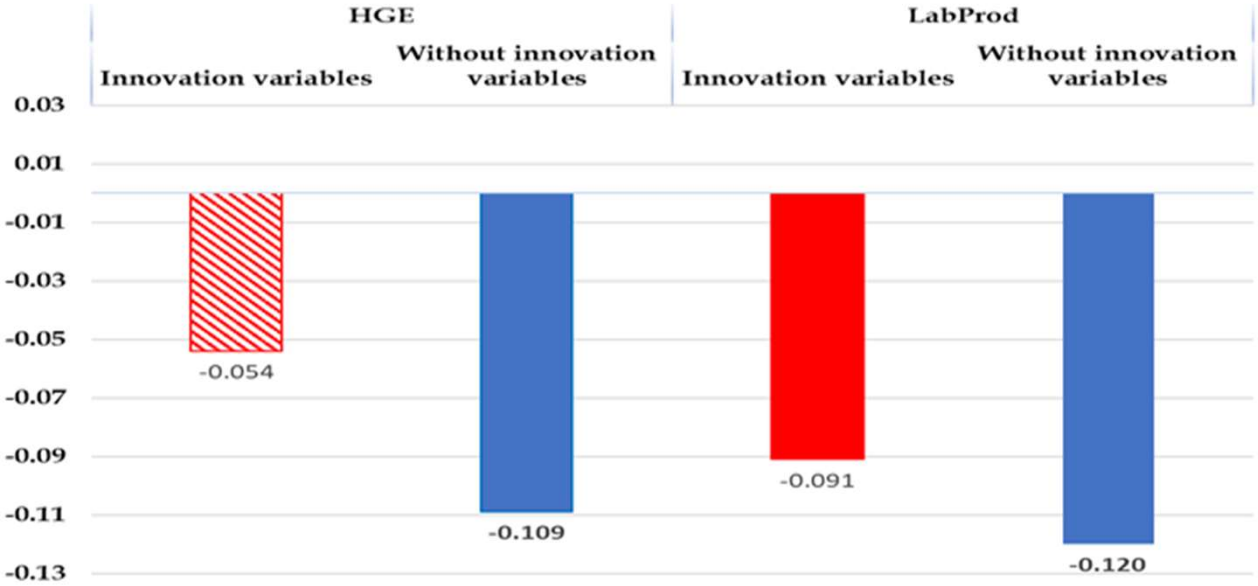
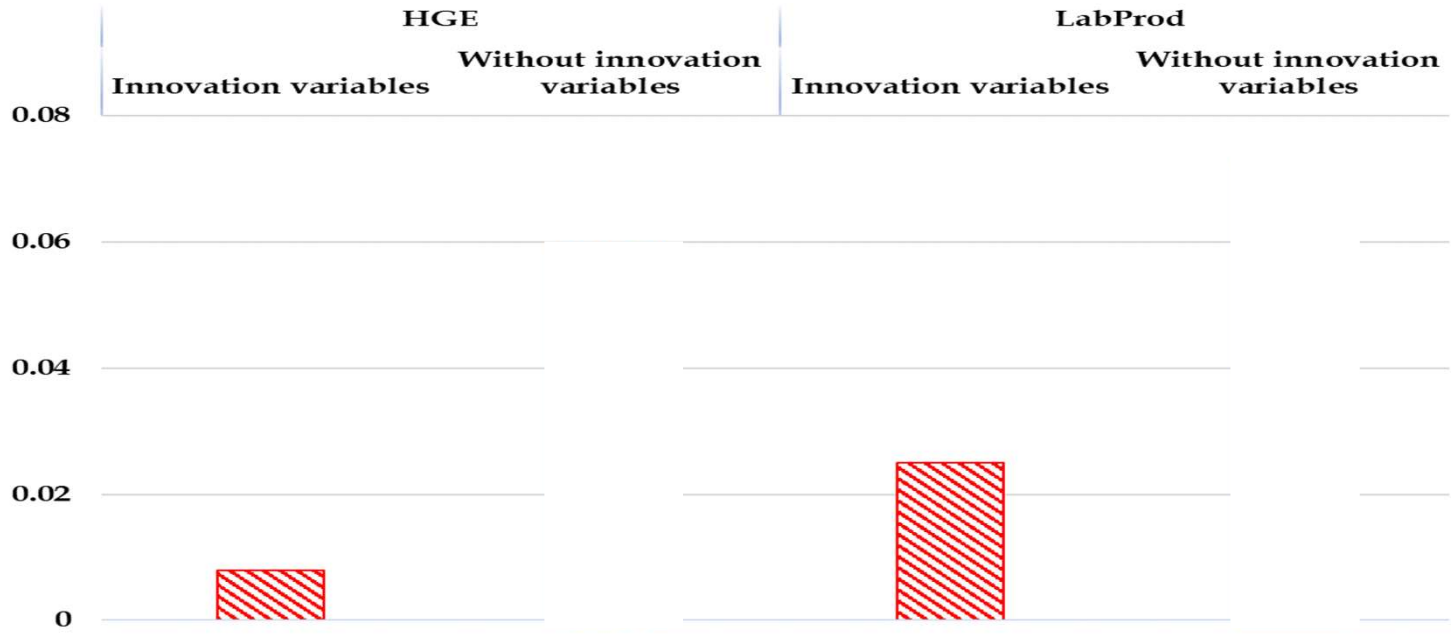


5. Results

5.3. Long-term impact on digitalization (1/2)

Graph 3. Estimated coefficients of the effect of being a HGE (*HGE*) and labour productivity in logs (*LabProd*). Dependent variable probability of digitalising due to COVID-19 pandemic. *Note: Independent variables refer to year 2019 while impact refers to long-term after 2020. Diagonal bars represent non-significant coefficients.*



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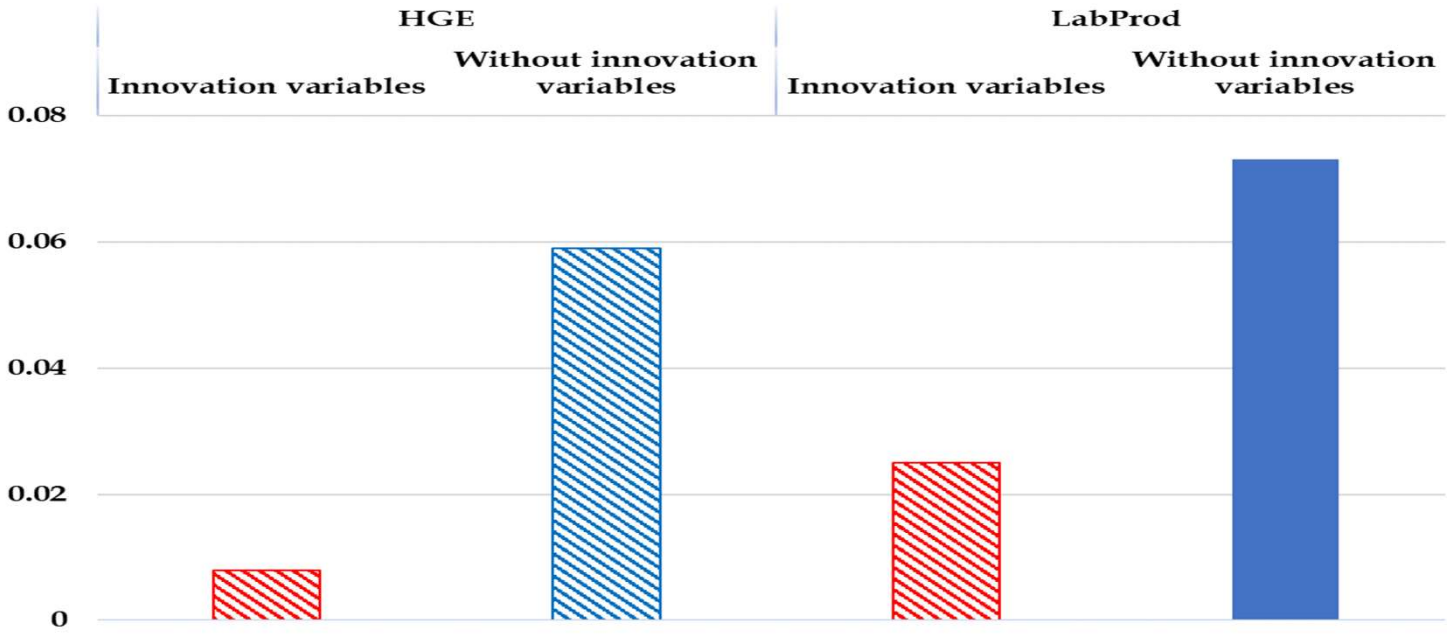
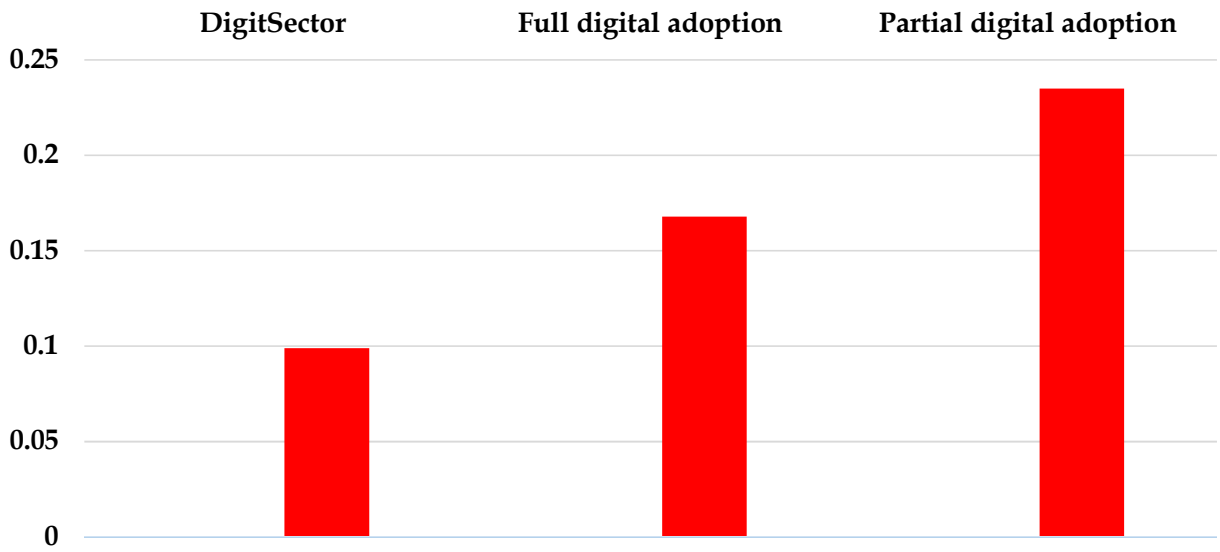


5. Results

5.3. Long-term impact on digitalization (2/2)

Graph 4. Estimated coefficients of belonging to a digitalised sector (*DigitSector*), and the full and partial digitalisation level before the pandemic (*Full digital adoption* and *Partial digital adoption*). Dependent variable probability of digitalizing due to COVID-19 pandemic. *Note: Independent variables refer to year 2019 while impact refers to long-term after 2020.*



6. Conclusions

The COVID-19 pandemic has caused an economic disruption →

1. Higher resilience of productive firms and HGEs
2. Need for sustainable economic recovery including digital and green transition

Our results show:

- **Short term**:
  - We confirm a within adjustment at firm level since **low productive firms** decreased the number of employees as a reaction of the crisis.
- **Long term**:
  - **More productive firms** are less likely to expect to reduce their employment and higher probability to digitalise.
  - **HGEs** have a lower probability of reducing their employment in the long term. The innovative nature of HGEs is one of the main characteristics associated with this. We consider that long-term expectations are not so linked with past growth episodes, but rather to how the firm develops its internal capabilities that result in a larger competitiveness in the market.
  - Our results remark a widening gap in terms of the **degree of digitalization** across firms and emphasises the importance of generating a core of internal abilities at firm level.

6. Conclusions

- **Policy implications**:
  - Trying to foster the digitalisation and internal capability of all firms in order to increase their competitiveness, resilience and capacity of recovering.
  - This strategy may avoid a neo-dualism between highly digitalised companies and those that are far from the technological frontier.

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