The Digitalized Economy

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Introduction

Digital transformation is reshaping how firms compete and trade. For firms, digital tools reduce entry barriers, lower costs, and enhance efficiency. Yet, empirical evidence on how digitalization affects productivity and trade across firms, especially, micro, small and medium enterprises (MSMEs), and countries remains scarce. This study uses harmonized firm-level microdata (MDI) to assess the role of digital technologies in enhancing productivity and trade outcomes.

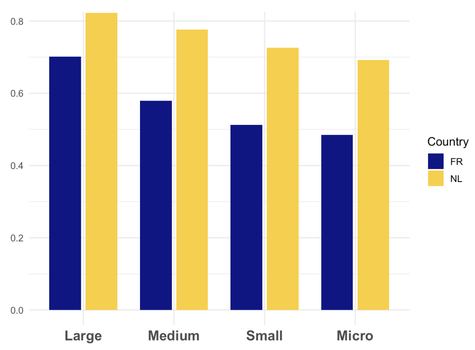
Digitalization across Europe

Firms' digital adoption is measured by a **digital score**, the row mean of selected ICT indicators:

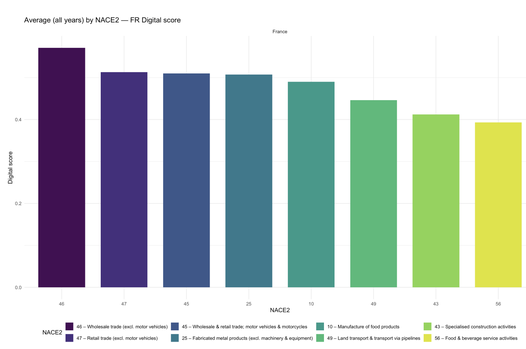
$$DigitalScore_i = \frac{1}{K}\sum_{k=1}^{K} ICT_{ik},$$

ranging from 0 (no adoption) to 1 (full adoption).
Components: internet access and broadband; online presence and e-commerce; cloud and big data; CRM and integration tools; e-invoicing; ICT staff and skills.

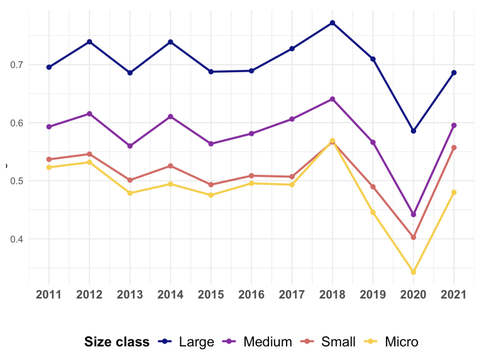
Figure 1: Digital Score (DS): by size, by sector, and over time



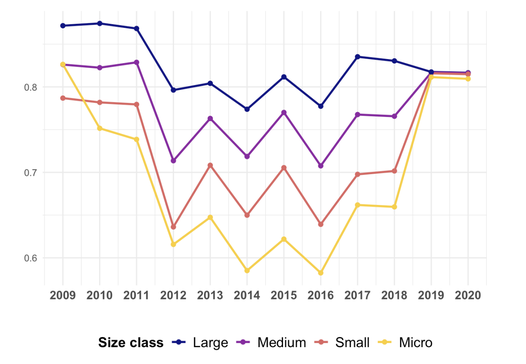
(a) Average DS by size class



(b) Average DS by NACE2



(c) DS over time France



(d) DS over time Netherlands

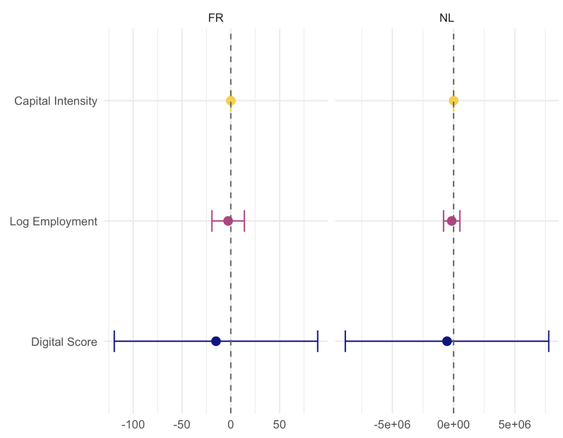
Notes: Bars show averages across all available years; lines show yearly means.

Digitalization and Trade

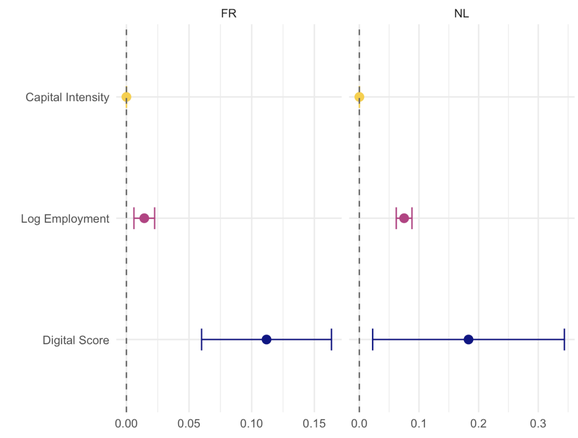
Digitalization can lower transaction costs and expand market reach, increasing the probability of exporting and boosting export intensity.

- **Exporter status (Logit):** $Pr(exporter_{it} = 1) = \alpha + \beta\, digital\_score_{it} + \gamma_1 \log(emp_{it}) + \gamma_2 capital\_intensity_{it} + \delta_{sector} + \delta_{year}$
- **Export intensity (OLS):** $export\_intensity_{it} = \alpha + \beta\, digital\_score_{it} + \gamma_1 \log(emp_{it}) + \gamma_2 capital\_intensity_{it} + \delta_{sector} + \delta_{year} + \epsilon_{it}$

Figure 2: Digitalization and Trade



(a) Export Intensity (OLS)



(b) Exporter Status (Logit)

Notes: 95% CIs.
Figure 2 shows that digitalization is positively associated with trade outcomes in both France and the Netherlands. A higher digital score increases the probability of exporting, while its link to export intensity is statistically insignificant.

Digitalization and Productivity

1. Digitalization contribution to labour productivity

We estimate how firm-level digitalization (composite digital score) correlates to labor productivity (value added per employee).

- Model 1: $labor\_prod_{it} = \alpha + \beta\, digital\_score_{it} + \epsilon_{it}$
- Model 2: $labor\_prod_{it} = \alpha + \beta\, digital\_score_{it} + \gamma_1 \log(emp_{it}) + \gamma_2 capital\_intensity_{it} + \epsilon_{it}$
- Model 3: $labor\_prod_{it} = \alpha + \beta\, digital\_score_{it} + \gamma_1 \log(emp_{it}) + \gamma_2 capital\_intensity_{it} + \delta_{sector} + \delta_{year} + \epsilon_{it}$

Figure 3: Digitalization and Productivity

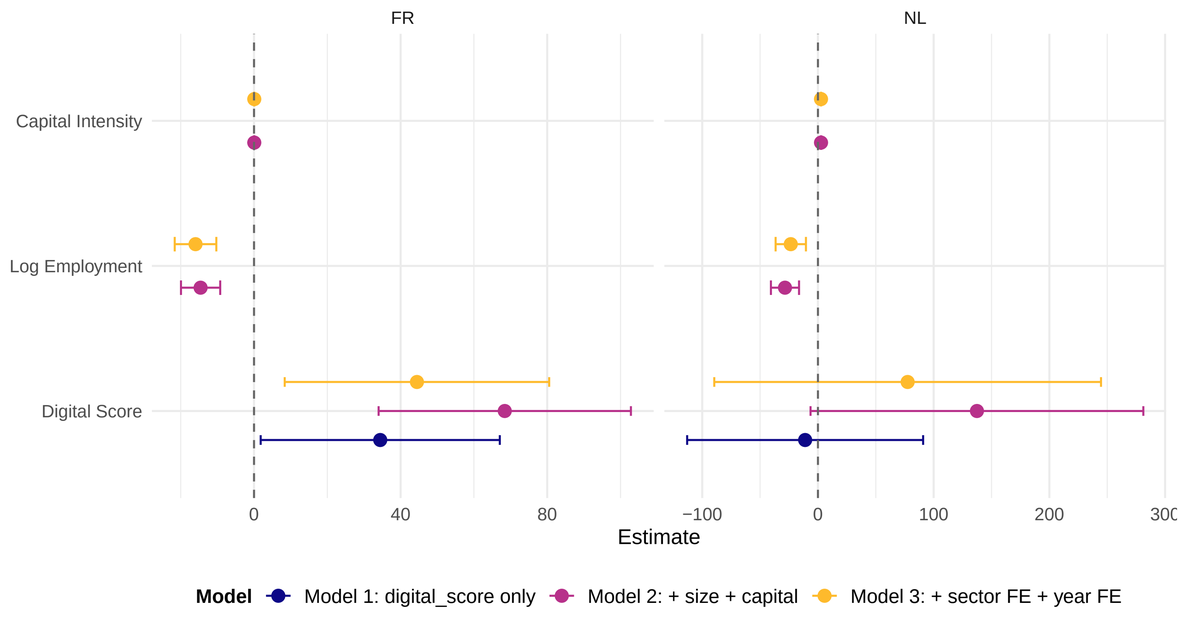


Figure 3 shows that in France, digitalization is positively associated with labor productivity, even after adding controls and fixed effects. In the Netherlands, the effect of digitalization on productivity is not significant, suggesting a weaker or context-specific relationship.

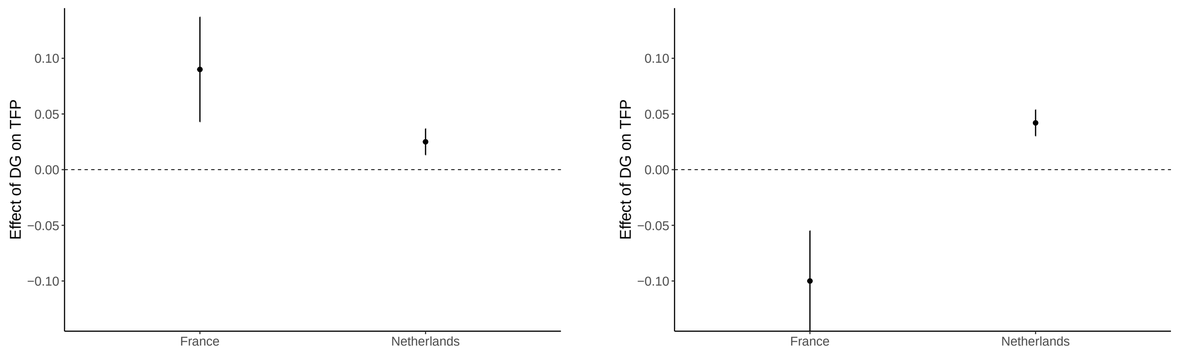
2. Digitalization contribution to TFP

The contribution of digitalization to TFP is estimated as:

$$\text{TFP}_{it} = \alpha + \beta DG_{it} + \gamma_1 LProd_{it} + \gamma_2 RInv_{it} + \gamma_3 Exp_{it} + \delta_s + \epsilon_{it}$$

where DG_{it} is a dummy for digitalization (online sales or purchases), and the controls include labour productivity, real investment, export status, and sector fixed effects.
Figure 4 shows that digitalization, especially online sales, is positively associated with firm productivity. The relationship is weaker for online purchases.

Figure 4: Digitalization and TFP



(a) Online Sales and TFP

(b) Online purchases and TFP

Notes: 95% CIs.

Conclusions

Our results for France and Netherlands reveal that digital adoption is linked with international trade and productivity (future work is needed to understand the causal relationship through exogenous shocks to digitalization).

- Time trends reveal persistent differences across firm sizes and sectors, with large firms leading adoption in both countries.
- In France, firms with higher digital scores are more productive. In the Netherlands, the effect on labour productivity is not significant. Digitalization, defined as the use of the internet for sales, is also found to have a significant correlation with productivity, even after controlling for typical factors to productivity, such as investment, size, and export (less clear relationship with online purchases).
- In both France and the Netherlands, digitalization raises the likelihood of exporter status, while the effect on export intensity is not significant.

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