

Tracking the Digital Divide: Factor Analysis and Time Trends in Italian Firms

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01 July 2024



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Cumulative Dissertation

Chapter 1



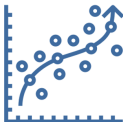
*Bibliometric Analysis of European Research on Digital Divide:
An Exploration of the Corporate Landscape*

Chapter 2



*Adapting Van Dijk's Resources and Appropriations Theory:
Toward a Resources and Technology Integration Framework
at the Firm Level*

Chapter 3



*Tracking the Digital Divide: Factor Analysis and Time Trends
in Italian Firms*

1. Introduction

- ▶ DT play a pivotal role in reshaping business models ([Trischler and Li-Ying, 2023](#)) , driving innovation ([Ciarli et al., 2021](#)), and fostering competitive advantages ([Jegan Joseph Jerome et al., 2024](#)).
- ▶ The unequal adoption of DT has led to significant challenge: the digital divide.
- ▶ The digital divide at the firm level is a multifaceted gap characterized not only by disparities in access, skills and usage of DT, but also the derived benefits from different types of use.
- ▶ While the digital divide is a global issue, its impact on enterprises, especially in Italy, presents unique challenges and opportunities.

2. Objectives

- ▶ Explore changes over time in the digital divide, focusing on differences across firm sizes, sectors, and regions.
- ▶ Develop composite indices to track trends in the first and second-level digital divide.
- ▶ Evaluate the alignment of resources and technology integration theory with observed data.
- ▶ Propose targeted policy interventions based on research findings.

3. Data

- ▶ The dataset was derived from the ICT Usage in Enterprises Survey conducted annually between 2014 and 2019 by ISTAT.
- ▶ In total, 29 variables were used to extract three factors that represent the theoretical constructs.
 - ▶ Access index: 6 variables
 - ▶ Skills index: 9 variables
 - ▶ Usage index: 11 variables
 - ▶ **Control variable:** Firm size with three categories (small, medium, large)
- ▶ Considerations and Limitations.
 - ▶ Independence of Annual Data
- ▶ Data treatments, codes, and summary statistics, are available on my [GitHub repository](#) for replicability and further analysis.

4. Methodology

- ▶ The indices were constructed using dimensionality reduction techniques Factor Analysis for Mixed Data (FAMD) and Multiple Correspondence Analysis (MCA).

$$\text{Access Index}_i = \sum_{j=1}^6 a_j \cdot X_{j,i} \cdot w_i$$

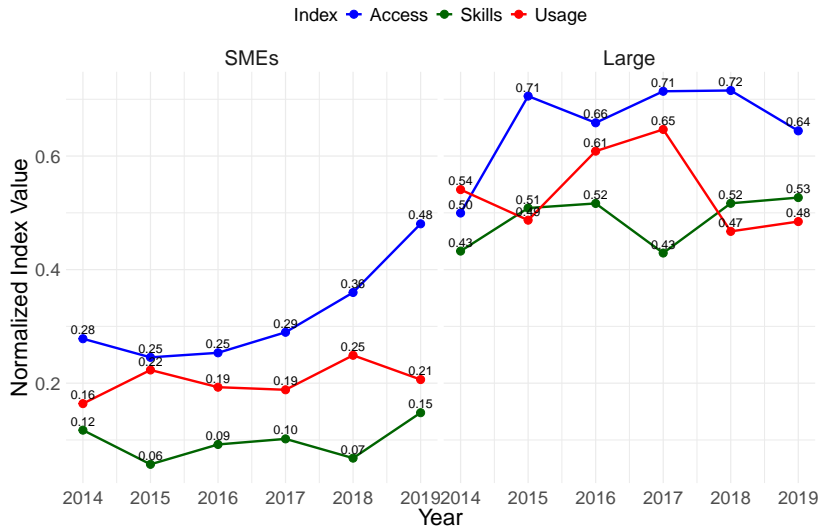
$$\text{Skills Index}_i = \sum_{k=1}^9 b_k \cdot Y_{k,i} \cdot w_i$$

$$\text{Usage Index}_i = \sum_{m=1}^{11} c_m \cdot Z_{m,i} \cdot w_i$$

Where **X**, **Y**, and **Z** are the matrices of observations, **a**, **b**, and **c** are the vectors of weights derived from FAMD and MCA contributions of each variable to the retained dimensions, and **w** is the vector of weights accounting for the share of groups and years.

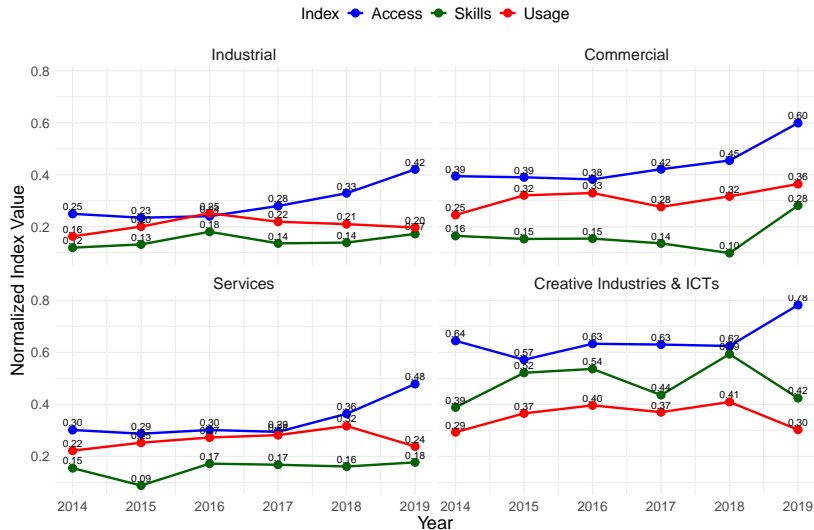
5. Results I

Yearly Trends in Access vs Skills vs Usage



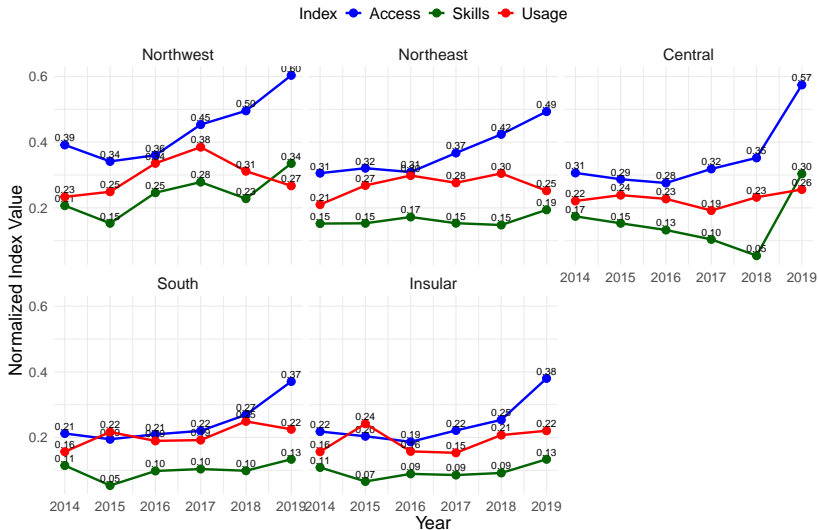
5.1. Results II

Yearly Trends in Access vs Skills vs Usage



5.2. Results III

Yearly Trends in Access vs Skills vs Usage



6. Q&A

Thank you for your attention

References I

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