



# Go Global, Act digital: The Impact of Digitalization on Chinese Global Value Chain Position



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## Abstract

- We investigate the causal effect of digitalization on firms' positioning within the global value chains (GVCs).
- By developing a stylized model on how the extent of digitalization affects a firm's optimal span of stages along GVCs and empirically testing the derived hypothesis by utilizing data on Chinese exporters, we find that digitalization enables firms to broaden their span of production stages by shifting imports further upstream and directing exports towards final demand.
- We further show that this impact is attributed to the effects of digitalization on enhancing firm innovation capability, increasing the utilization of high-skilled labor, improving resource allocation efficiency, and mitigating information costs.

## Background & Theoretical Framework

### Research Background

- Over the past few decades, the rise of GVCs has fundamentally transformed the landscape of international trade by enabling the fragmentation of production across firm and country boundaries. As the world continues to witness these profound shifts in global trade dynamics, the role of digitalization in trade has become an emerging area of inquiry.
- China offers a ideal setting for studying the influence of digitalization on global production lines with rapidly embracing the digital technologies and establishing itself as a leader in digitalization. Moreover, China's economy has fostered a pronounced dependence on global production since its accession to WTO.

### Theoretical Framework

- Our model builds upon the partial-equilibrium framework introduced by Chor et al. (2021). A price-taking firm makes strategic decisions regarding how upstream to import intermediate inputs and how downstream to export the final goods, leading to a specific range of stages along global production lines. We extend their analysis to incorporate the role of digitalization, specifically emphasizing the significance of data as a novel factor of production and endogenizing the influence of digital transformation. Our model highlights that the degree of digital transformation determines the efficiency and effectiveness of processing unstructured information and leveraging data inputs to bolster profitability.

□ **Hypothesis:** A higher degree of digitalization would induce the firm to import more upstream inputs and/or export products closer to final demand, thereby resulting in a broader span of production stages that the firm engages in.

## Research Design

We formulate the econometric model as follows:

$$GVC_{ft} = \beta_0 + \beta_1 Digit\_trans_{ft} + \Psi Controls_{f0} \times \gamma_t + \varphi_f + \eta_{it} + \varepsilon_{ft}$$

where  $f$ ,  $i$  and  $t$  denote firm, industry, and year, respectively.

- GVC includes the export upstreamness ( $U^X$ ), the import upstreamness ( $U^M$ ), and the span of production stages in GVCs ( $GVC\_stage$ ).
- Digit trans signifies the degree of digital transformation for firm  $f$  in year  $t$ , measured by tallying the frequency of digital-related keywords in annual reports.
- Controls refer to a large set of control variables related to firm characteristics.

## Data

### ➤ GVC measurements

- Chinese Customs Trade Statistics (CCTS) from 2000 to 2016
- Chinese Input-Output Tables in the year 2007

### ➤ Firm characteristics

- China Stock Market and Accounting Research (CSMAR) database
- Wind Data Service (WIND)

### ➤ City characteristics

- China City Statistical Yearbook

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## Baseline Results

	(1) $U^X$	(2) $U^M$	(3) $GVC\_stage$	(4) $U^X$	(5) $U^M$	(6) $GVC\_stage$
<i>Digit_trans</i>	-0.012** (0.006)	0.027* (0.014)	0.039*** (0.015)	-0.014** (0.006)	0.027** (0.014)	0.041*** (0.015)
<i>Controls</i>	No	No	No	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>Obs</i>	7,115	7,115	7,115	7,010	7,010	7,010
<i>R-squared</i>	0.943	0.734	0.728	0.944	0.736	0.731

□ The results reveal that digital transformation encourages firms to export closer to final demand and import more upstream intermediate inputs, thereby broadening their engagement across production stages within GVCs.

### ➤ Robustness checks:

- Addressing endogeneity (IV)
- Accounting for locational factors
- Accounting for industry features
- Using alternative measures of digital transformation and GVC positioning

## Further Analysis

### ➤ The underlying mechanisms

- Aligned with our theoretical framework, our investigation centers on exploring the contributions of four plausible mechanisms:
  - ✓ Digitalization strengthens a firm's innovation capability.
  - ✓ Digitalization enhances a firm's human capital structure.
  - ✓ Digitalization improves a firm's resource allocation efficiency.
  - ✓ Digitalization diminishes a firm's information costs.

### ➤ Heterogeneous effects

- we examine several distinct firm characteristics, intricately connected to the mechanisms, which might shape the influence of digitalization. The impact of digitalization on GVC positioning is more significant for firms
  - ✓ with higher initial productivity;
  - ✓ with a stronger human capital foundation;
  - ✓ with state-controlled ownership;
  - ✓ with greater information dependency.

## Contribution

- Our study extends the trade literature on GVCs, with a specific focus on the emerging interest in the span of production stages. More specifically, we present pioneering work in revealing the impact of digitalization on the expansion of production processes for individual firms. This exploration expands upon recent investigations that link a firm's attributes to its strategic choice of the position in GVCs, thereby contributing to the broader understanding of this crucial area.
- This paper enhances the burgeoning literature on the real economic impacts that stem from the advancement of digital technologies. By establishing a theoretical model and evaluating the underlying mechanisms, we are among the first to provide a structural interpretation and robust causal inferences for the role of digitalization in global production line position.
- This study adds to the body of literature examining the implications of technology adoption on corporate strategy, moving beyond the well-explored domain of internet-based technologies. By offering insights into the intricate dynamics between digitalization and GVC positioning, this research contributes to a deeper understanding of the influential technological forces that underpin firm organizational decisions.

## References

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