Economic Perspectives and Trends, 2025, 2(2), 84-86
https://www.hillpublisher.com/Journals/ept/
ISSN Online: 3066-3180

Research on the Global Value Chain Upgrading in Countries along the Belt and Road Initiative

Qinyun Li

Southeast University, Jiangsu 214135, Nanjing, China.

How to cite this paper: Qinyun Li. (2025) Research on the Global Value Chain Upgrading in Countries along the Belt and Road Initiative. *Economic Perspectives and Trends*, 2(2), 84-86.
DOI: 10.26855/ept.2025.12.006

Received: October 15, 2025
Accepted: November 12, 2025
Published: December 31, 2025

***Corresponding author:** Qinyun Li, Southeast University, Jiangsu 214135, Nanjing, China.

Abstract

This paper examines the global value chain position of Belt and Road countries, using a blend of theoretical research and empirical analysis, it investigates the driving factors behind the global value chain upgrading in these countries, specifically examining trade and investment as the key domains of study. This paper uses the value-added trade method and data from the ADBMRIO database to analyze the division of labor among 34 Belt and Road countries from 2007 to 2017. Regression models are then established using panel data to assess the impact of various factors on the global value chain upgrading. Findings reveal that tariff levels negatively affect Global Value Chain upgrading, while outward foreign direct investment has a positive impact. Economic development and human capital also positively influence Global Value Chain upgrading. However, the impact of technology research and development investment is relatively weak, and excessive physical capital hampers value chain upgrading due to imperfect market resource allocation mechanisms in most Belt and Road countries.

Keywords

Global Value Chain Upgrading; Belt and Road Initiative; International trade

1. Introduction

Since World War II, the trend of globalization and regional integration in the world economy has continued to develop, leading to increasingly close connections between countries. The traditional international division of labor has ceased to exist, gradually transitioning from inter-industry division of labor to intra-industry division of labor, and further evolving into an international trade division system based primarily on the intra-product division of labor. Intra-product division of labor has begun to develop towards vertical specialization, forming a new pattern of division of labor in the global value chain (Gereffi & Gary, 2005).

China has gradually integrated into the global value chain led by developed countries such as Europe, America, and Japan, thanks to its abundant labor and resource endowment advantages in the processing and assembly stages of products (Gereffi & Lee, 2012). The trade scale has rapidly expanded, and the trade surplus has continued to increase. Due to the awkward situation of China's international trade, characterized by large trade volume, low domestic value-added, and little trade gain, it has become the country subject to the most "double anti" investigations globally for consecutive years (Mudambi, 2008). Under the current global value chain division system, the actual trade gains obtained by China are very low. With the continuous integration of the technology sector and the manufacturing sector, the status of the manufacturing sector in the global value chain has been elevated. However, overall, it has still not escaped the dilemma of challenges in value chain upgrading. (Fernandez et al., 2014).

Under the background of the Belt and Road Initiative, how to better achieve global value chain upgrading has

attracted much attention. Some scholars believe that this new international cooperation platform can not only promote many developing countries along the route to achieve open development by following China's footsteps but also contribute to transforming traditional international division of labor patterns and achieve coordinated upgrading of the global value chain in countries along the route (Gereffi & Kaplinsky, 2001). Thus, this paper will briefly review the existing literature on GVC upgrading and the influences that affect GVC upgrading under the context of the Belt and Road Initiative, then use empirical tests to show the driving factors behind the global value chain upgrading in these countries and finally conclude.

2. Empirical Analysis

2.1 Model Specification

This section empirically examines the determinants of global value chain (GVC) upgrading among countries along the Belt and Road Initiative. Building on the classical framework developed by Khan and Sokoloff (2004), this study constructs an extended econometric model to assess the effects of trade liberalization and outward foreign direct investment (OFDI) on a country's GVC position. Relevant control variables are incorporated to account for other key factors influencing GVC upgrading.

2.2 Variables

This study adopts the value-added trade approach proposed by Koopman et al. (2009) to measure global value chain participation and position. Compared with the vertical specialization index, this method more accurately captures both indirect and re-imported value added in exports. Global Value Chain Participation (GVCP) and Global Value Chain Position (GVCL) are calculated as dependent variable. Trade Liberalization (Tariff) and OFDI Technology Spillovers (Sofdi) are independent variables. Following existing literature, import tariff rates are used to measure the degree of trade liberalization. Lower tariffs indicate greater openness to international trade (Hummels et al., 2001). OFDI spillovers are measured using the framework proposed by Potterie and Lichtenberg. Control variables include physical capital (measured by the ratio of fixed capital formation to GDP), human capital (tertiary education enrollment rate), R&D investment intensity (R&D expenditure as a share of GDP), and economic development level (per capita GDP growth rate).

2.3 Regression Results

Panel regressions are conducted using STATA 17.0. The Hausman test strongly favors the fixed effects model over the random effects specification. To reduce multicollinearity, control variables are introduced sequentially.

The results indicate that import tariffs exert a negative effect on GVC upgrading, although the magnitude is relatively small. This suggests that further tariff reductions may have limited marginal effects, possibly due to already low tariff levels among Belt and Road countries. OFDI technology spillovers have a significant positive impact on GVC position, highlighting the role of reverse technology spillovers in enhancing domestic technological capabilities and promoting value chain upgrading. Economic development exhibits a strong positive effect, implying that higher income growth supports technological innovation, economies of scale, and deeper participation in global production networks. The effect of R&D investment becomes more significant as additional controls are added, suggesting a lagged effect of R&D on GVC upgrading. Although its short-term impact is limited, R&D investment contributes to long-term human capital accumulation and technological progress. Human capital shows a consistently positive and significant effect, indicating that higher levels of skilled labor improve productivity, facilitate technology absorption, and increase domestic value added. In contrast, physical capital has a negative coefficient, possibly reflecting inefficient investment and misallocation of resources under diminishing returns, which may hinder productivity growth and value chain upgrading.

To ensure robustness, the regression analysis is re-estimated after excluding data from 2009, a year marked by a sharp decline in GVC positions due to the global financial crisis. The results remain consistent in terms of sign and significance, confirming the robustness of the empirical findings.

3. Conclusions

Based on the ADBMRIO2018 database released by the Global Value Chain Research Institute from 2007 to 2017,

this study employs the value-added trade method and utilizes fixed effects models to examine the driving factors behind the global value chain upgrading in countries along Belt and Road Initiative (Mahutga, 2012). Firstly, drawing upon existing literature, this paper establishes the Belt and Road Initiative as the contextual background to delineate the influencing factors of GVC upgrading in countries along the Belt and Road. Secondly, an empirical analysis, conducted using panel data from China and 34 countries along the Belt and Road from 2007 to 2017, is constructed to investigate the impact of trade liberalization and foreign direct investment on the upgrading of the global value chain. The empirical analysis provided valuable insights into the determinants of global value chain division status. Lastly, robustness checks confirmed the reliability of the regression results, reaffirming the importance of the identified factors in shaping the global value chain division of labor.

This paper concludes some research findings. Firstly, foreign direct investment, human capital, and economic development levels significantly promote the upgrading of the global value chain. Secondly, while the role of technology research and development investment in upgrading the position in the global value chain is relatively weak, it can have a positive impact on the upgrading of the global value chain in countries along the Belt and Road Initiative after long-term capital accumulation, possibly due to the lengthy transformation process from input capital to output technology. Thirdly, tariff barriers and physical capital levels hurt the division of labor in the global value chain, possibly because trade tariffs in various countries are currently at low levels and their influence is gradually diminishing. Under the law of diminishing marginal returns, the extensive investment in physical capital leads to a certain degree of resource wastage.

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