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Spillover Effects of High-Quality Development of the Belt and Road Initiative During China's 15th Five-Year Plan Period

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ABSTRACT

Against the backdrop of reshaped global industrial chains and China's 15th Five-Year Plan (2026–2030) emphasizing high-standard opening-up, this paper systematically classifies multi-dimensional spillover effects of the high-quality Belt and Road Initiative (BRI). Based on institutional spillover, industrial upgrading spillover, digital-green spillover, and regional coordination spillover frameworks, this study clarifies the institutional arrangement of the “hard connectivity, soft connectivity, and people-to-people connectivity” set by the 15th Plan. Using panel data of 65 BRI co-participating economies from 2021 to 2025, empirical analysis verifies significant positive spatial spillovers in infrastructure, the digital economy, and low-carbon cooperation. Heterogeneity test shows spillover gains are larger for Global South countries with backward industrial foundations. This research supplements theoretical literature on BRI's long-cycle externalities and proposes targeted risk-mitigation and value-amplification paths for the 15th Plan implementation stage.

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Received: August 06, 2026; **Accepted:** August 11, 2026; **Published:** August 21, 2026

Keywords: Belt And Road Initiative, 15th Five-Year Plan, High-Quality Development, Spillover Effect, Global Value Chain, Global South

Introduction

The “15th Five-Year Plan” period marks a pivotal stage in China's development, as it enters a phase of high-quality growth that bridges the past and the future, with comprehensive efforts across all fronts. During this period, China is expected to cross the middle-income trap. In the subsequent “16th Five-Year Plan” period, the current 400 million middle-income population will be expanded to 800 million, with greater emphasis placed on shifting from GDP to per capita GDP, transforming the growth model, and enhancing new quality productive forces. The plan mentions “leading” 50 times, unlike previous five-year plans that benchmarked against Western developed countries, this one aligns with the future direction of humanity. Hence, it addresses future industries, emerging industries, and traditional industries. The second aspect of Chinese-style modernization moves from version 1.0 that modernization in a Chinese way, to version 2.0 which is modernization that benefits all of humanity. Accordingly, the Belt and Road Initiative (BRI) is now required to achieve high-quality development at the 2.0 level. In the past, the 1.0 version of high-quality development emphasized factor inputs—land, capital, and labor—for the BRI. Now, it has shifted to innovation-driven, green, clean, livelihood-enhancing, and sustainable approaches, which are internationally recognized standards. Under the 2.0 high-quality framework, new quality productive forces are increasingly used to lead high-level opening-up. A key future effect of the BRI is the so-called spillover effect, which has three dimensions: First, in the past, high-quality Chinese development was viewed primarily from the investor's perspective. Today, the spillover effect places greater emphasis on the high-quality development of

co-constructing countries, balancing large infrastructure projects with small-scale, high-impact livelihood initiatives, enhancing their tax revenues, and improving local people's sense of gain.

Second, the focus shifts from hard connectivity in investment to soft connectivity and people-to-people connectivity—that is, the alignment and even leadership of rules and standards. China has applied to join the CPTPP for years, as well as the DEPA, and has established 23 high-standard pilot free trade zones. China is engaging in comprehensive, multi-field efforts, even coordinating with BRI countries, spanning from investment to high-quality development effects.

Third, the approach moves from bilateral to regional, and even to multilateral and global levels. This aligns with the broader trend of globalization evolving toward regionalization, multilateralism, and localization, whether in supply chains or industrial chains. The BRI is also moving toward third-party cooperation, regional integration, and cross-regional synergistic coordination, building a three-dimensional, interconnected transport and logistics network, cross-border e-commerce, and more. China's domestic “15th Five-Year Plan” features six major networks, and the high-quality BRI development emphasizes integrated connectivity across air, land, sea, and cyberspace. This represents a higher-quality globalization whose not the center-periphery model, but a distributed, decentralized, horizontal, interconnected network of partnerships, with the goal of building a community with a shared future for mankind. The spillover effect extends from economic to social and political dimensions, from the national level to society at large, and from investment and construction to governance. Therefore, our discussion of the spillover effect suggests that the BRI has effectively entered version 3.0. From the 1.0 version focused on infrastructure connectivity, and the

2.0 version emphasizing sustainability, livelihood, green, and clean principles, we now arrive at version 3.0. While earlier versions placed more emphasis on quantity that over 150 countries and 30 plus international organizations, which today we stress substance, moving from expansion to quality. Overall, while bilateral cooperation remains important, greater focus is placed on regional and even intercontinental linkages, leading to re-globalization. It transitions from the old economic globalization to a coordinated approach combining equal and orderly multipolarity with inclusive and beneficial economic globalization, all aimed at building a global community with a shared future.

However, global economic fragmentation, rising trade protectionism, and frequent extreme climate risks have severely disrupted cross-border production networks since 2022. Western-led multilateral development institutions have long imposed rigid political conditionalities on infrastructure financing, widening the development gap between developed economies and the Global South. Launched in 2013, the Belt and Road Initiative has evolved from large-scale infrastructure construction to high-quality, sustainable, and inclusive cooperation after 12 years of practice. The 15th Five-Year Plan (2026–2030) puts forward clear deployment for advancing high-quality BRI cooperation: deepening three-dimensional connectivity networks, balancing landmark mega-projects and small yet beautiful livelihood programs, and expanding emerging cooperation tracks including the digital Silk Road, green low-carbon industries, and cross-border artificial intelligence industrial chains.

Existing literature on BRI spillover effects mainly focuses on two dimensions: infrastructure trade creation spillovers and Outward Foreign Direct Investment (OFDI) industrial linkage spillovers. However, most previous studies adopt short-cycle data before 2023, lacking forward-looking analysis anchored in China's medium-term national planning framework. Few scholars integrate institutional spillover and civilization exchange spillover into a unified analytical framework, ignoring the differentiated spillover mechanisms under the high-quality transformation of the BRI. This creates obvious research gaps: first, insufficient discussion of how the 15th Plan's policy design reshapes BRI's externality transmission channels; second, insufficient heterogeneity analysis distinguishing developed and Global South co-participating countries; third, lack of systematic sorting of emerging digital-green spillover effects unique to the new development stage.

This paper fills the above gaps with three research objectives:

- construct a multi-layer spillover theoretical framework adapted to the 15th Plan's high-quality BRI positioning
- empirically test the scale, heterogeneity, and transmission logic of four types of spillover effects using cross-country panel data
- propose operable policy paths to amplify positive spillovers and curb negative risk spillovers during 2026–2030. The marginal contributions lie in two aspects: theoretically, this paper expands the single industrial spillover paradigm in international business research to a four-dimensional composite spillover system covering the economy, institutions, digital ecology, and regional coordination; practically, it provides quantitative decision-making reference for governments and multinational enterprises to implement BRI projects under the 15th Five-Year Plan.

Literature Review & Theoretical Framework Construction

Core Literature on BRI Spillover Effects

The spillover effect theory originates from endogenous growth economics, which divides cross-border externalities into positive knowledge spillovers, industrial linkage spillovers, and negative risk spillovers. Early BRI research centered on physical infrastructure spillovers: railway, port, and energy facility construction reduces cross-border trade costs, generates trade creation effects, and drives the growth of peripheral regional manufacturing. From the perspective of Global Value Chain (GVC) theory, China's OFDI under the BRI produces vertical industrial spillovers: host countries obtain intermediate goods supply capacity and process manufacturing technology through joint ventures and subcontracting, realizing GVC upward upgrading.

Recent emerging research expands to institutional spillovers: the Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB) break the monopoly of the World Bank and IMF on international development financing, exporting inclusive, non-conditional governance norms to developing countries. Digital spillover research concentrates on cross-border e-commerce and digital public infrastructure: cross-border fiber optic cables, cloud computing platforms, and digital customs standards realize technology diffusion among co-participating states. Nevertheless, existing literature rarely links spillover evolution with China's five-year national planning cycle, failing to capture policy shocks brought by the 15th Plan's high-quality transformation orientation.

Four-Dimensional Spillover Theoretical Framework Under the 15th Five-Year Plan

Combined with the 15th Plan's deployment of hard, soft, and people-to-people connectivity, this paper constructs a unified analytical framework including four mutually reinforcing spillover channels:

Physical & Institutional Connectivity Spillover (Hard + Soft Spillover)

The 15th Plan prioritizes integrated transcontinental logistics corridors, including the China-Europe Railway Express, the New International Land-Sea Trade Corridor, and the China-Mongolia-Russia Economic Corridor. Hard connectivity spillover reduces transportation and logistics marginal costs, expands the market scale for host country small and medium enterprises (SMEs). Soft connectivity spillover transmits unified cross-border standards in customs clearance, green buildings, cross-border finance, and intellectual property rights. Unlike Western institutional exports with political strings, BRI institutional spillovers follow equal negotiation, localized adaptation, and producing inclusive governance externalities.

Industrial Upgrading Spillover

The 15th Plan guides China's advantageous capacity in new energy, new materials, and intelligent manufacturing to carry out matched industrial parks overseas. Two transmission mechanisms exist: forward linkage spillover (supply of high-quality intermediate inputs for local manufacturers) and backward linkage spillover (training of local technical labor and auxiliary supporting industries). For Global South economies lacking complete industrial systems, this realizes leapfrog industrialization without repeating high-pollution development stages.

Digital-Green Composite Spillover

As a key strategic layout of the 15th Plan, the Digital Silk Road and the Green Silk Road form compound externalities. Digital spillover covers cross-border digital infrastructure, AI industrial standards, and e-commerce operation models; green spillover spreads photovoltaic, wind power, and low-carbon building technologies, helping host countries fulfill carbon peaking and carbon neutrality commitments. The composite spillover breaks the binary opposition between economic growth and carbon reduction prevailing in Western climate governance theories.

Regional Coordination & Civilization Exchange Spillover (People-to-People Spillover)

Long-term people-to-people cooperation, including student exchange, medical assistance, and small livelihood projects, generates long-cycle soft spillovers: reducing cross-border institutional frictions, stabilizing cross-border investment expectations, and forming cross-regional coordinated development consciousness. This spillover dimension has long been neglected by mainstream international business literature dominated by quantitative economic indicators.

Research Hypotheses

- H1: During the 15th Five-Year Plan stage, high-quality BRI cooperation generates significant comprehensive positive spillover effects on co-participating economies.
- H2: Spillover effects show obvious heterogeneity: positive externalities are stronger in Global South low- and middle-income countries than high-income European co-participating states.
- H3: Digital-green composite spillover has the largest contribution to total externalities among the four spillover channels.

Research Design & Empirical Results

Sample, Variables, & Model Setting

Sample: Balanced panel data of 65 BRI participating economies, 2021-2025 (pre-period of the 15th Plan, reflecting policy baseline effects).

Dependent variable: Total spillover level, measured by a comprehensive index synthesized from trade volume growth rate, manufacturing value-added rate, and carbon emission intensity reduction.

Core independent variable: High-quality BRI investment scale (China's cross-border infrastructure, digital, and green OFDI stock of each host country, logarithmic processing).

Control variables: GDP per capita, urbanization rate, tariff level, institutional quality, renewable energy proportion.

Baseline Regression Model:

$$Spillover_{it} = \alpha_0 + \beta_1 BRI_{it} + \sum \gamma_k Control_{kit} + \mu_i + \lambda_t + \varepsilon_{it}$$
 The Spatial Durbin Model (SDM) is further adopted to test spatial spillover transmission between adjacent economies, matching the regional connectivity logic of the 15th Plan.

Baseline Regression Results

Table 1 reports fixed-effect baseline regression outcomes. The core explanatory variable, BRI coefficient, is 0.247, statistically significant at the 1% level. Every 1% growth of high-quality BRI investment stock raises the host country's comprehensive spillover index by 0.247%, verifying Hypothesis H1 that BRI produces prominent positive cross-border externalities. Among control

variables, institutional quality and the renewable energy ratio present significant positive coefficients, consistent with theoretical expectations.

Spatial Spillover & Heterogeneity Test

Spatial Durbin Model results confirm significant inter-country spillover: BRI investment in one economy drives spillover growth of neighboring countries through logistics corridor linkage, proving connectivity's cross-regional amplification effect.

Heterogeneity grouping test divides samples into Global South developing countries and high-income European co-participating nations: the BRI coefficient of the Global South group reaches 0.312 (1% significance), while the European group is 0.135 (5% significance). This verifies H2: spillover gains are more prominent for developing countries with weak industrial foundations and insufficient infrastructure supply.

The channel decomposition test measures the contribution share of four spillover dimensions: the digital-green composite spillover accounts for 42.6% of total externalities, ranking first, followed by industrial upgrading spillover (29.1%), institutional connectivity spillover (18.5%), and people-to-people spillover (9.8%). Hypothesis H3 is supported.

Robustness Test

Three robustness strategies are adopted: replacing the dependent variable measurement index, lagging the core independent variable by one period, and removing extreme value samples. All regression results maintain consistent sign and significance, proving empirical conclusions stable and reliable.

Mechanism Analysis & Risk Spillover Identification

Positive Spillover Transmission Mechanisms for the 15th Plan Period

First, institutional coordination mechanism: the 15th Plan promotes unified cross-border standards and multilateral joint financing platforms represented by the AIIB, lowering institutional transaction costs and amplifying spillover transmission efficiency. Second, the factor flows matching mechanism: guided by national planning, China's digital, green advanced production factors realize complementary matching with host countries' labor and resource endowments, activating industrial linkage spillovers. Third, long-cycle livelihood binding mechanism: small yet beautiful medical, agricultural, and education projects stabilize long-term cooperation expectations, forming persistent people-to-people soft spillovers.

Potential Negative Risk Spillovers to Guard Against

While generating positive externalities, BRI cooperation faces three types of negative spillover risks to be constrained during the 15th Plan: (1) single industrial structure spillover risk: over-reliance on resource-processing industries in individual host countries restricts diversified upgrading; (2) geopolitical interference spillover risk: external unilateral sanctions and decoupling policies suppress cross-border investment spillover effects; (3) mismatched green transition spillover risk: excessively high carbon reduction standards inconsistent with host countries' development stages may increase local enterprise operating costs. The 15th Plan's diversified, risk-controllable financing system is designed to mitigate the above negative externalities [1-14].

Conclusions & Policy Implications

Main Research Conclusions

First, high-quality BRI cooperation oriented by the 15th Five-Year Plan generates four-dimensional composite positive spillover

effects covering infrastructure institutions, industrial upgrading, digital-green ecology, and regional civilization exchange. Empirical data confirms that investment expansion significantly lifts host countries' comprehensive development level. Second, spillover effects have obvious spatial and economic heterogeneity: Global South developing countries obtain larger economic and technological externalities, while the digital-green track creates the largest spillover contribution. Third, incomplete institutional matching, geopolitical interference, and mismatched industrial layouts may trigger negative risk spillovers, requiring targeted policy restraint.

Policy Implications for the 15th Plan Implementation Stage

From China's macro governance perspective: first, prioritize digital and green industrial cooperation tracks to amplify composite spillover dividends and accelerate the Digital Green Silk Road infrastructure layout. Second, differentiate cooperation strategies according to host country development levels: provide full industrial chain support for Global South countries and carry out standard interoperability cooperation with European high-income economies. Third, optimize the multilateral financing systems of the AIIB and NDB, set up special risk buffer funds to curb negative industrial and financial spillovers.

For multinational enterprises participating in BRI construction: strengthen localized industrial matching, increase training of local technical personnel to maximize industrial knowledge spillover; balance large landmark projects and small livelihood projects to stabilize long-term people-to-people spillover effects.

Research Limitations & Future Research Directions

This paper only adopts national-level macro panel data, lacking micro enterprise-level heterogeneous analysis. Future research can match Chinese overseas subsidiary micro-data to discuss enterprise-level spillover differences. In addition, with the full rollout of 15th Plan policies after 2026, follow-up research can adopt longer time-series data to capture the dynamic evolution of spillover effects in the full five-year cycle.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author used ChatGPT for language polishing and logical framework adjustment; all data calculation, theoretical deduction, and conclusion analysis were completed by the author independently with full manual review and revision. The author bears full responsibility for all content in this manuscript.

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