

A Study on the International Competitiveness of the Bicycle Industry in China, the United States and Europe

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ABSTRACT

Driven by the differentiated recovery of the global economy, the regionalization of supply chains, and the trends of health and low carbon, the bicycle industry has upgraded towards “sports and leisure + green travel + intelligent technology”, with segmented areas such as electric bicycles becoming growth engines. This paper adopts the International Market Share (IMS), Trade Competitiveness Index (TC), and Revealed Comparative Advantage Index (RCA) to conduct a quantitative analysis of the international competitiveness of the bicycle industry in China, the United States, and the European Union. The results show that although China’s IMS, TC, and RCA have declined in recent years, it still takes the lead globally and maintains strong international competitiveness; the United States’ indicators show small fluctuations and a steady upward trend, while the European Union’s indicators have larger fluctuations but achieved significant growth, and both have taken over part of China’s market share. Meanwhile, enterprises represented by Giant Machinery have enhanced their international competitiveness through the layout of global production and sales.

KEYWORDS

Bicycle Industry; International Comparative study; Revealed Comparative Advantage Index; International Competitiveness

1. RESEARCH BACKGROUND

The current global economic landscape is characterized by “differentiated recovery and intertwined risks”. During 2023-2024, global GDP growth remains around 3%, yet significant disparities exist between developed economies and emerging markets—the United States demonstrates economic resilience underpinned by consumption and industrial policies; the Eurozone struggles with sluggish growth amid lingering energy crisis impacts and inflationary pressures, while China advances high-quality development amid structural adjustments. Against this backdrop, global industrial division of labor is shifting from “efficiency-first” to “balancing efficiency with security”, with evident trends toward supply chain regionalization and near-shoring. As the three dominant entities collectively accounting for over 60% of global GDP and possessing substantial regulatory influence, the evolving competitiveness of China, the United States, and the European Union directly shapes the restructuring of global value chains.

Meanwhile, “health-conscious consumption” and “low-carbon transition” have emerged as definitive trends transcending economic cycles, revitalizing the bicycle industry. Globally, the industry’s market size has expanded from USD 54 billion in 2020 to USD 72 billion in 2024, achieving a compound annual growth rate exceeding 7%. Within this landscape, Europe serves as the core high-end market, supported by its mature cycling culture (over 35% of the population are cyclists); China remains the world’s largest producer and consumer (accounting for 60% of global production and 30%

of domestic sales); while the United States represents a major importer of mid-to-high-end products (with annual imports surpassing USD 15 billion). The industry's identity is evolving from a "traditional commuting tool" to a multifaceted domain integrating "sports and leisure, green travel, and intelligent technology". Segments such as electric bicycles (E-bikes) and intelligent cycling equipment are growing at rates exceeding 20%, establishing themselves as key drivers of industry expansion.

Global bicycle sales exhibit distinct "economic cycle correlation". During economic upswings, rising disposable income fuels consumption upgrades, driving surging demand for mid-to-high-end road bikes, mountain bikes, and smart e-bikes, while accelerated urban green transportation infrastructure development stimulates commercial market expansion for bike-sharing systems. Under this dual impetus, global bicycle sales surged by 18% year-on-year in 2021. Conversely, during economic downturns such as the 2022 global inflation spike, mid-to-high-end bicycle sales in European and American markets contracted by 12%, coupled with corporate reductions in commercial bike fleet deployments, directly contributing to a slowdown in global sales growth to 3%.

More critically, economic downturns often coincide with shifts in trade policy. Since 2023, twelve countries have imposed additional tariffs or strengthened technical barriers on bicycles and components. For instance, the European Union introduced new carbon footprint certification requirements for imported e-bikes, while the United States implemented subsidies for domestic e-bike production through the Inflation Reduction Act. Such "trade-substitution strategies", while alleviating short-term pressure on local industries, exacerbate global supply chain fragmentation and further amplify sales volatility.

This study constructs an analytical framework for international bicycle competitiveness using three metrics: International Market Share (IMS), Trade Competitiveness Index (TC), and Revealed Comparative Advantage Index (RCA), applying them to conduct a quantitative assessment of the bicycle industries in three major economies: China, the United States, and the European Union.

2. AN ANALYSIS OF INTERNATIONAL COMPETITIVENESS IN THE BICYCLE INDUSTRY OF CHINA, THE UNITED STATES, AND THE EUROPEAN UNION.

This study employs a triad of indicators—IMS, TC, and RCA—to undertake a quantitative analysis of the bicycle industry's international competitiveness across these three major economies [1].

(1) Analysis of international market share

The IMS is adopted to analyze the global presence of the bicycle industry in China, the United States, and Europe. IMS refers to the proportion of a country's total export value of a specific industry in the world's total export value of that industry.

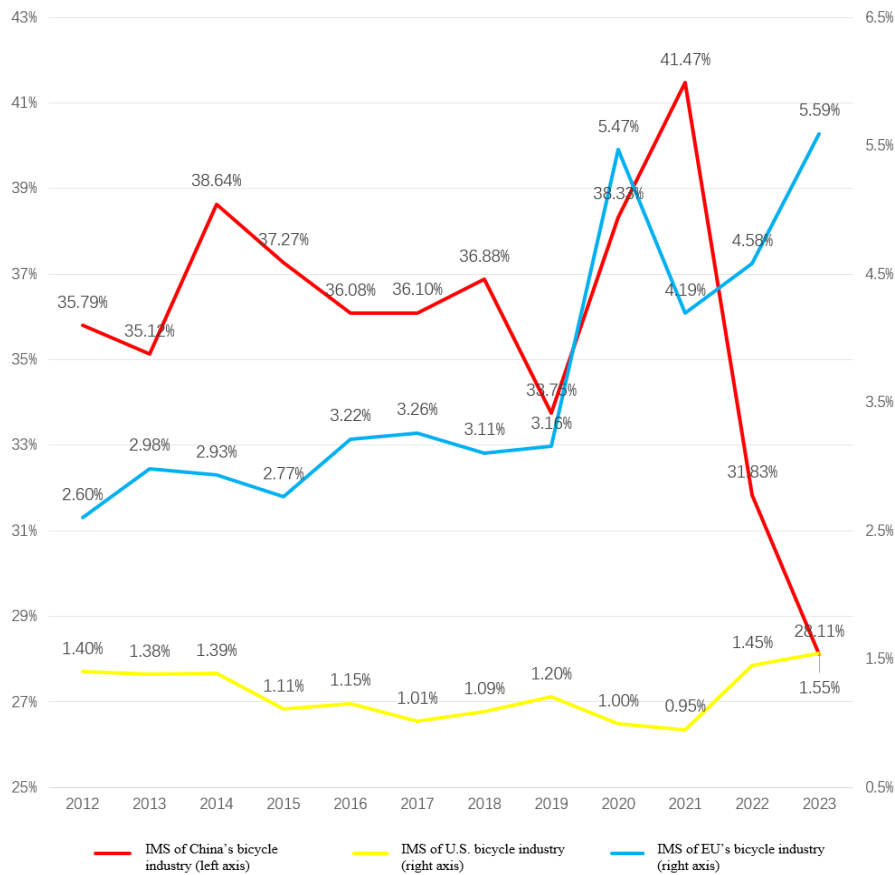


Figure 1. International market share of the bicycle industry in China, the United States, and the European Union (2012-2023)

As shown in Figure 1, China’s IMS in the bicycle sector followed a trajectory of initial steady growth followed by sustained decline between 2012 and 2023. From 2012 to 2021, China's IMS increased from 35.79% to its peak in two decades (41.47%), with a particularly rapid ascent from 33.75% to 41.47% occurring between 2019 and 2021. However, a consistent downward trend emerged starting in 2021, driving the share down sharply to 28.11%. The most pronounced fluctuation—approximately 10 percentage points—occurred between 2021 and 2022, primarily attributable to global supply chain disruptions caused by the COVID-19 pandemic, which significantly impacted China’s bicycle exports.

As for the United States, its IMS in the bicycle sector demonstrated a pattern of initial gradual decline followed by steady growth from 2012 to 2023. Between 2012 and 2021, the U.S. IMS decreased from 1.4% to 0.95%. However, beginning in 2021, it rose steadily from its lowest point in nearly two decades (0.95%) to reach a peak of 1.55% by 2023. The most significant fluctuation—approximately 0.5 percentage points—occurred between 2021 and 2022, driven primarily by U.S. bicycle manufacturers optimizing supply chains, improving production efficiency, and introducing more high-end models to meet consumer demand for premium bicycles.

Regarding the European Union, its IMS for bicycles exhibited an overall upward trend from 2012 to 2023. During the period from 2012 to 2019, the EU’s IMS experienced steady growth, rising gradually from an initial 2.6% to 3.16%. Beginning in 2020, the fluctuation amplitude of the EU’s IMS intensified, with a sharp increase to 5.47% in 2020 followed by a decline to 4.19% in 2021. In recent years, the EU’s IMS climbed from 4.19% in 2021 to 5.59% in 2023, primarily driven by a series of “green travel” policies implemented by EU member governments that encouraged bicycle usage and provided subsidies for E-bikes.

A comparative analysis of bicycle IMS among China, the U.S., and the EU reveals that fluctuations during the 2012-2019 period were notably smaller than those observed between 2019 and 2023,

indicating intensified competition in the global bicycle market since 2019. From 2021 onward, while China’s IMS experienced a substantial decline, both the U.S. and EU recorded modest gains, reflecting a partial redistribution of China’s global market share to these economies during periods of supply chain disruption. When comparing China and the EU specifically, their IMS trajectories showed similar trends prior to 2021 but began diverging markedly thereafter, demonstrating increasingly fierce competition for market share within the existing global bicycle industry landscape. A parallel competitive dynamic is observed between China and the United States.

(2) TC Index analysis

The TC Index measures the proportion of a country’s trade surplus in a specific industry to its total trade value of related products, reflecting the competitive advantage or disadvantage of that industry in the international market. This section employs the TC Index to assess the competitive positions of the Chinese, American, and European bicycle industries.

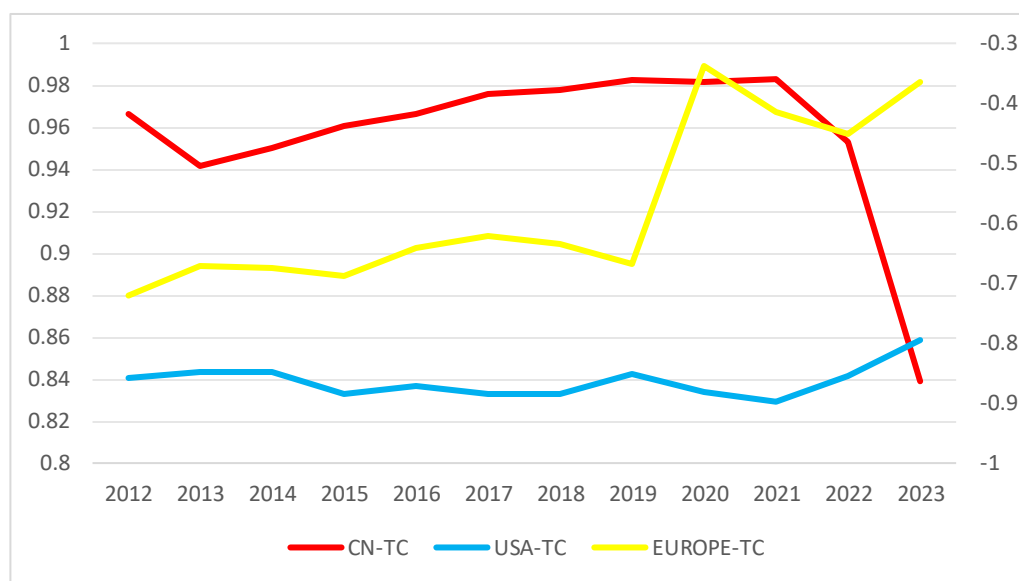


Figure 2. TC Index of the bicycle industry in China, the United States, and the European Union, 2012-2023

As shown in Figure 2, China’s Bicycle TC Index followed a trajectory of initial decline, subsequent steady growth, and finally a sustained downturn between 2012 and 2023. From 2012 to 2021, the index decreased from 0.9663 in 2012 to 0.9415 in 2013, before climbing to its peak of 0.9829 in 2021. A consistent decline commenced in 2021, driving the index sharply down to 0.8390 by 2023. The most pronounced fluctuation—approximately 0.114 points—occurred between 2022 and 2023. Throughout this period, China's TC Index consistently remained above 0.8, reflecting the sustained strong international competitiveness of its bicycle industry.

As for the United States, its Bicycle TC Index demonstrated a fluctuating but overall upward trend from 2012 to 2023. During the 2012-2021 period, the index decreased from -0.8594 in 2012 to -0.8857 in 2015, subsequently rose to -0.8524 by 2019, before reaching its lowest point in the decade at -0.8977 in 2021. Beginning in 2021, the U.S. TC Index then increased rapidly, climbing from -0.8977 to -0.7949 by 2023. The most substantial fluctuation—approximately 0.061 points—occurred between 2022 and 2023. Throughout this ten-year period, the index consistently remained negative, reflecting a comparative disadvantage in the international competitiveness of the U.S. bicycle industry, potentially attributable to substantial inventory sell-offs during the pandemic period.

Regarding the European Union, its Bicycle TC Index followed a trajectory of initial gradual increase, subsequent slight decline, and eventual recovery between 2012 and 2023. During the 2012-2020 period, the index rose from -0.7207 in 2012 to -0.3378 in 2020, then decreased to -0.4502 in 2022 before reaching -0.3650 in 2023. Beginning in 2019, the EU’s TC Index showed rapid improvement,

surging from -0.6664 to -0.3378 in 2020, representing the most significant fluctuation (approximately 0.3286 points). Throughout the past decade, the EU's TC Index consistently remained negative, with its lowest point at -0.7206 in 2012, indicating relatively weak international competitiveness in the bicycle industry. The sharp increase observed during 2019-2020 likely reflects heightened bicycle demand within the EU and pandemic-induced shifts in transportation patterns.

A comparative analysis of the TC Index across China, the U.S., and the EU reveals that fluctuations during the 2012-2019 period were less pronounced than those observed between 2019 and 2023, indicating intensifying competition in the global bicycle market since 2019. From 2021 onward, while China's TC Index experienced a substantial decline, both the U.S. and EU recorded modest improvements, suggesting a partial absorption of China's international market share by these economies during periods of global supply chain disruption. In a direct China-EU comparison, their TC Index trajectories showed similar trends prior to 2021 but began diverging markedly thereafter, reflecting increasingly fierce competition for market share within the existing global bicycle industry landscape. A parallel competitive dynamic is observed between China and the United States.

(3) RCA Index analysis

The RCA Index measures the relative international competitiveness of a product by comparing a country's export share of a specific industry to its global counterpart. It is calculated as the ratio of a country's export share of an industry to the world's export share of that same industry. The national share is derived by dividing the country's export value of the industry by its total export value of all goods. The world share is calculated by dividing the global export value of the industry by the total global export value of all goods. The RCA Index is then obtained by dividing the national share by the world share. An RCA value greater than 1 indicates that the industry's export proportion in the country exceeds its proportion in global exports, reflecting strong international competitiveness. An RCA value between 0 and 1 suggests a lack of comparative advantage and weaker international competitiveness. If the RCA equals 1, the industry's competitiveness is at the median level, demonstrating neither relative advantage nor disadvantage.

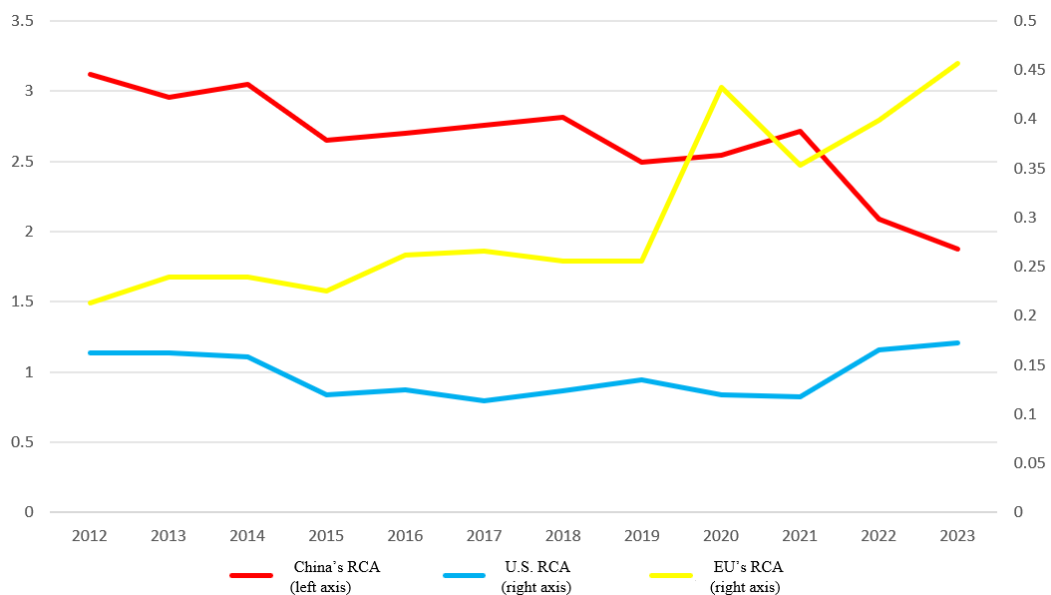


Figure 3. RCA Index of the bicycle industry in China, the United States, and the European Union (2012-2023)

As shown in Figure 3, China's RCA index has remained between 1.8739 (2023) and 3.1199 (2012) over the past decade, indicating that the international competitiveness of China's bicycle industry is 2 to 3 times higher than the world average.

As shown in Figure 3, China's Bicycle RCA Index exhibited a general downward trend from 2012 to 2023, albeit with intermittent periods of slow recovery. During the 2012-2021 period, the index declined from 3.1199 in 2012 to 2.6470 in 2015, then gradually recovered to 2.8137 by 2018, before decreasing again to 2.4918 in 2019 and subsequently rebounding to 2.7111 in 2021. Ultimately, it fell sharply to its lowest value of 1.8740 in 2023. The most substantial fluctuation—approximately 0.8372 points—occurred between 2021 and 2023.

As for the United States, its Bicycle RCA Index demonstrated a fluctuating but overall upward trend from 2012 to 2023. During the 2012-2021 period, the index decreased from 0.1620 in 2012 to 0.1195 in 2015, followed by six years of continual fluctuations until a notable improvement emerged in 2021, rising from 0.1176 to 0.1725 by 2023. The most significant fluctuation—approximately 0.048 points—occurred between 2021 and 2022.

As for the European Union, its Bicycle RCA Index exhibited a stepwise upward trajectory from 2012 to 2023, albeit with a notable decline between 2020 and 2021. During the 2012-2019 period, the index increased from 0.2132 in 2012 to 0.2555 in 2019, then surged to 0.4319 in the following year. It subsequently declined to 0.3528 by 2021 before climbing to 0.4566 in 2023. The most pronounced fluctuation—approximately 0.1764 points—occurred between 2019 and 2020.

A comparative analysis of the RCA Index across China, the United States, and the European Union reveals that fluctuations during the 2012-2019 period were less pronounced than those observed between 2019 and 2023, indicating intensifying competition in the global bicycle market since 2019. Over the twelve-year period, China's RCA Index demonstrated a gradual decline, while the United States showed a modest increase and the EU registered a substantial rise, reflecting a partial absorption of China's international market share by the American and European markets during periods of global supply chain disruption. In a direct China-EU comparison, their RCA trajectories were nearly inverse throughout most of the period, with synchronized upward movement occurring only between 2019 and 2020. This pattern underscores the increasingly intense competition for market share within the existing global bicycle industry landscape, a dynamic similarly observed between China and the United States. Throughout the 2012-2023 period, the RCA indices for both the United States and the European Union remained below 0.5, indicating that their international competitiveness in the bicycle industry lagged behind the global average.

3. MAIN CONCLUSIONS

Overall, the metric results from the three economies over the past decade indicate that although China's IMS, TC Index, and RCA Index have shown a declining trend in recent years—with significant drops during the COVID-19 pandemic—it remains undeniable that China's influence in the global bicycle industry continues to surpass that of both the United States and the European Union, maintaining substantial worldwide impact. [2] While the corresponding metrics for Europe and the United States are lower than China's during the same period, their fluctuations have been relatively moderate, and they demonstrated resilience during the pandemic by maintaining or even enhancing their competitiveness. In recent years, the international competitiveness of the U.S. and EU bicycle industries has shown consistent, albeit gradual, growth. Although all three U.S. indicators are lower than those of the EU, they have fluctuated less and remained more stable, with average volatility lower than both China and the EU. The EU's indicators, while trailing China's, exceed those of the United States; however, they experienced greater fluctuations between 2019 and 2023. Currently, China continues to hold a leading position in the global bicycle industry. Despite a decline in its international market share, this status remains unshaken. Meanwhile, both the United States and the EU, though starting from smaller market shares, exhibit upward trajectories, with the EU in particular demonstrating noteworthy potential for future growth.

Global bicycle manufacturers, exemplified by Giant Manufacturing Co., Ltd. with its internationally recognized brands such as Giant, have established production bases across Greater China Region, Vietnam, Europe, and the United States. [3] This global footprint has created a worldwide value chain and supply-distribution network, enabling them to capture a substantial share of the international market (in 2024, their sales in Asian and Euro-American markets accounted for 43.42% and 42.13% of revenue, respectively). [4] These companies dynamically adjust their international strategies based on sales performance: when a product's global sales volume or revenue falls short of expectations, they evaluate which regions to continue its distribution and where to discontinue or discount it. Conversely, when performance meets or exceeds targets, they increase production and engage in brand-enhancing activities to stimulate consumer demand, thereby boosting quarterly sales. Strategic decisions, such as the timing of new product launches or the discontinuation of a product line, are informed by quarterly and annual financial reports. Simultaneously, tailoring sales strategies to regional markets is critical. Pricing for the same product varies across regions due to factors including exchange rates, logistics costs, tariffs, government subsidies, and feature configurations.

Based on this foundation, the article examines the international competitiveness of the bicycle industries in China, the United States, and the European Union. As academic research increasingly focuses on analyzing the international competitiveness of listed companies from a micro-level perspective, the importance of utilizing data from the annual reports of multinational publicly traded firms has become more pronounced. Future studies are expected to further concentrate on international comparative research of listed bicycle companies.

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