

Driving Mechanisms and Industrial Outcomes of Inward Chinese FDI in Vietnam's High-Tech Sectors under RCEP: Evidence from Electronics Manufacturing and Solar-Photovoltaic Supply Chains

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Abstract: Intensifying US-China trade tensions and the January 2022 entry into force of RCEP have together spurred a wave of supply-chain relocation. For many Chinese manufacturers, this has translated into a “China-Plus-One” production strategy, with Vietnam emerging as a primary destination. This paper investigates driving forces and industrial outcomes of inward Chinese FDI in Vietnam's high-tech sectors, focusing on electronics manufacturing and solar-photovoltaic supply chains for the period 2018–2024. Drawing on secondary datasets including Vietnam General Statistics Office (GSO), UN Comtrade, and peer-reviewed working papers, this study calculates Vietnam's Revealed Comparative Advantage (RCA) for HS 85 (electrical-electronic goods) and HS 8541 (semiconductor and photovoltaic products). Our results show RCA values of 2.88 for HS 85 and 8.44 for HS 8541 in 2022, demonstrating strong but assembly-driven export competitiveness. Firms backed by inward Chinese FDI generate roughly 75% of Vietnam's solar-panel exports and employ half of the workforce in this sector; nevertheless, domestic localisation in electronics remains merely 5–10%. Despite strong export performance, Vietnam remains heavily dependent on imported Chinese intermediate inputs, exposing its solar exports to US trade-remedy risks. This paper offers targeted policy recommendations for Vietnamese regulators and Chinese investors, alongside limitations rooted in publicly available secondary data.

Keywords: RCEP; inward Chinese FDI; revealed comparative advantage; Vietnam; electronics industry; solar-photovoltaic supply chains

1. Introduction

Two major shocks have reshaped global production since 2018: the US-China tariff dispute and the COVID-19 pandemic. Each, in its own way, pushed multinational firms to diversify their manufacturing bases, and the “China-Plus-One” model became a common response. Vietnam stands out as one of the main beneficiaries of this shift [1]. Vietnam emerged as one key beneficiary of this shift: United States imports from Vietnam jumped from US\$49.1 billion in 2018 to US\$66.5 billion in 2019 [1], and ASEAN economies have collectively absorbed over US\$200 billion in manufacturing FDI since 2019.

RCEP, effective from 1 January 2022, is the world's largest trade bloc, covering roughly 30 percent of global GDP across 15 economies. Its cumulative rules of origin allow inputs sourced from any member-economy

—crucially including China—to count toward preferential origin requirements, an institutional feature particularly consequential for assembly-intensive electronics and solar-panel production [2]. Against this backdrop, inward Chinese FDI in Vietnam’s electronics and solar sectors has expanded rapidly: electronics exports reached US\$405.5 billion in total Vietnamese exports in 2024, of which electronics and components alone contributed over US\$120 billion, while Vietnam’s solar panel industry grew from a negligible base in 2018 to capture over a quarter of US solar import demand by 2022 [1].

This paper asks: (RQ1) what factors drive inward Chinese FDI into Vietnam’s high-tech sectors under RCEP, and (RQ2) what industrial effects—on exports, comparative advantage, employment, and localisation—has this investment produced? Unlike prior industry commentary, this paper computes Vietnam’s actual RCA index from UN Comtrade-sourced data rather than relying on qualitative or anecdotal claims of competitiveness, and situates the results within an integrated driver–effect framework covering both electronics manufacturing and the solar panel supply chain.

2. Literature Review

Three theoretical strands inform this study. Dunning’s OLI paradigm holds that firms invest abroad when they possess Ownership advantages, the host offers Location advantages, and direct control offers Internalisation advantages over arm’s-length contracting [3]; Vietnam’s location advantages (labour cost, proximity to China, RCEP-preferential market access) are central to this paper’s argument. Krugman’s new trade theory highlights agglomeration economies, visible in Vietnam’s concentrated electronics clusters (Bac Ninh, Hai Phong) [4]. Gereffi’s global value chain (GVC) framework describes how developing-country participants typically enter at the labour-intensive assembly stage of buyer- or producer-driven chains—a pattern this paper’s localisation findings strongly support [5].

Empirical scholarship on RCEP underscores that tariff reductions represent only one dimension of the agreement’s economic impact. For Vietnam, cumulative rules of origin carry greater practical importance than tariff concessions for assembly-oriented manufacturing sectors [2]. These provisions allow components sourced from RCEP member economies (notably China) to count towards origin requirements. As a result, finished goods assembled in Vietnam using Chinese intermediate inputs can still qualify for preferential treatment under Vietnam’s various free-trade agreements.

On industrial effects, Ngov et al. provide the most rigorous firm-level evidence available: Chinese-affiliated FDI firms account for approximately 75 percent of Vietnam’s solar panel exports and 50 percent of sector employment [1], exporting panels around 38 percent cheaper than other Vietnam-based producers, a price advantage linked to Chinese-subsidised inputs roughly 30 percent cheaper than alternatives. By 2022 the industry comprised roughly 400 firms and 51,000 jobs. In electronics, localisation remains persistently low—estimated at 5–10% across most segments, well below the Vietnamese government’s official domestic-content target of 65% for 2025—while Vietnam’s solar exporters face escalating US trade-remedy risk following the US Department of Commerce’s 2023 circumvention finding against solar cells/modules assembled in Vietnam, Cambodia, Malaysia, and Thailand using Chinese-origin components [6].

3. Methodology

I use two methods: trend analysis of FDI and trade (2018–2024), and Balassa-type RCA calculations for two product categories:

$$RCA_{ij} = (X_{ij}/X_{iw}) / (X_{wj}/X_{ww})$$

where X_{ij} is Vietnam’s exports of product j , X_{iw} is Vietnam’s total exports, X_{wj} is world exports of product j , and X_{ww} is world total exports. An RCA value above 1 indicates revealed comparative advantage.

It should also be emphasised that the Balassa RCA index measures export specialisation rather than domestic value-added. A high RCA value can be driven purely by final-stage assembly relying on imported intermediate inputs and does not automatically demonstrate robust indigenous industrial capacity. HS 8541 also covers semiconductor products outside solar-photovoltaic goods, representing the closest available commodity classification for this study [7].

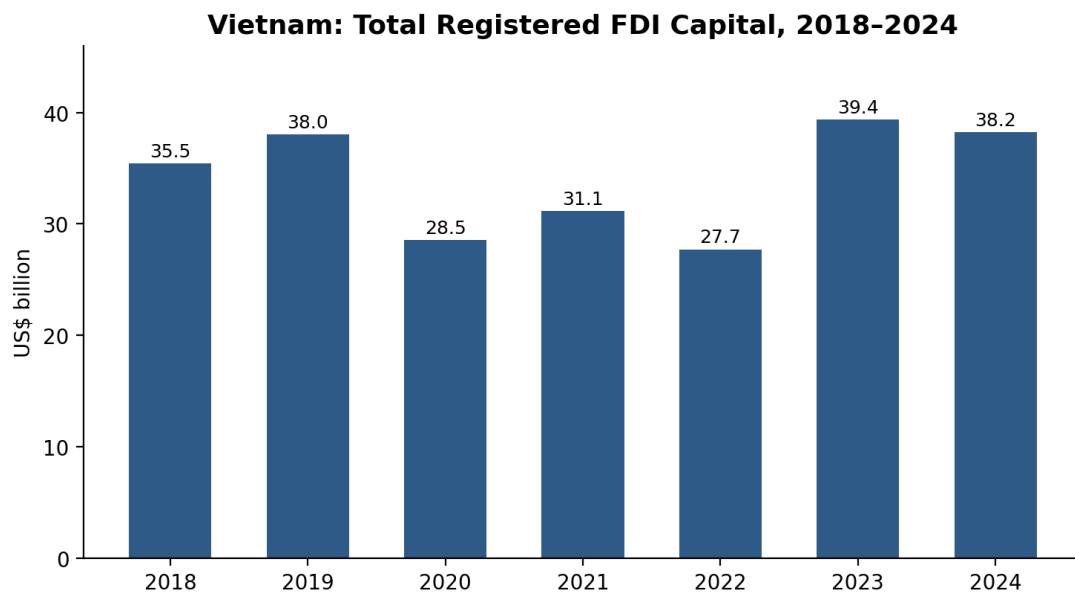
The RCA is computed for two product groups using 2022 data (the most recent year with complete, mutually consistent Vietnam and world figures across all required series): HS 85 (electrical machinery and electronics, broadly) and HS 8541 (semiconductor devices, including photovoltaic cells/panels—the closest available HS category to “solar panels”). All underlying trade values are drawn from UN Comtrade data as mirrored by TrendEconomy and the World Bank’s World Integrated Trade Solution (WITS) [8]; world totals are cross-checked against WTO merchandise trade statistics [9]. FDI and total export series (2018–2024) are drawn directly from Vietnam’s General Statistics Office (GSO) and Ministry of Planning and Investment (MPI).

Note that the FDI dataset used records registered inward FDI capital, not disbursed realised investment; registered values are typically higher than actual capital deployed on the ground, which constitutes an important data limitation.

4. Results

4.1. FDI Trend, 2018–2024

Vietnam’s total registered FDI capital has fluctuated between roughly US\$27.7 billion and US\$39.4 billion per year since 2018 (Figure 1), dipping during the pandemic years (2020–2022) before rebounding to a near-record US\$39.4 billion in 2023 and US\$38.2 billion in 2024. China has been among the top two or three source countries by both project count and registered capital value in most years since 2019, and ranked first in the number of newly-registered FDI projects in 2024 (28.3% of total new projects), as well as in registered capital during the first half of 2025 [2,10].



Source: General Statistics Office of Vietnam (GSO); Ministry of Planning and Investment (MPI).

Figure 1. Vietnam’s Total Registered FDI Capital, 2018–2024. Note: This figure reports registered FDI capital, not disbursed/realised FDI. Registered investment values are typically higher than actual capital deployed in Vietnam.

4.2. Export Growth and Revealed Comparative Advantage

Vietnam’s total merchandise exports grew from US\$243.5 billion in 2018 to a record US\$405.5 billion in 2024—a 66.5 percent cumulative increase (Figure 2)—with electronics (HS 85) consistently the largest single export category, reaching US \$140 billion (37 percent of total exports) in 2022 alone (TrendEconomy/UN Comtrade data).

Table 1 presents the actual RCA computation for 2022, the most recent year with complete, cross-consistent data for both Vietnam and world totals.

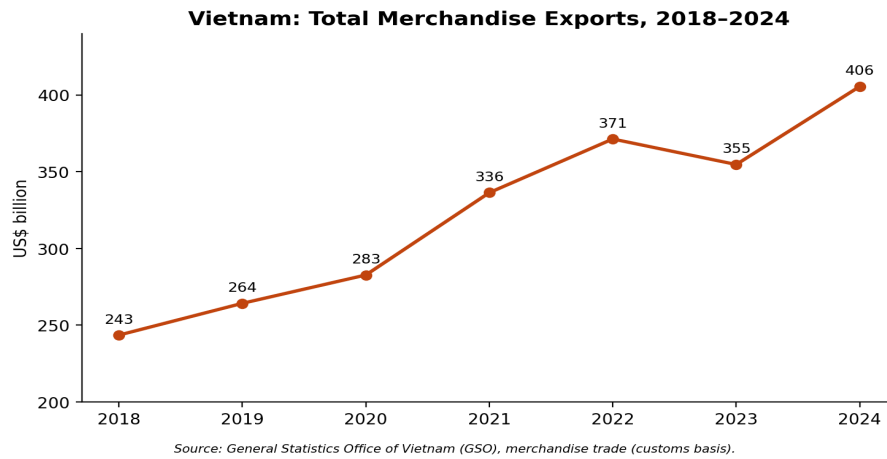


Figure 2. Vietnam's Total Merchandise Exports, 2018–2024.

Table 1. Revealed Comparative Advantage (RCA) Computation, Vietnam, 2022.

Component	HS 85 (Electronics, Overall)	HS 8541 (Semiconductors/ Photovoltaic Cells)
Vietnam exports of product (X_{ij})	US\$140.0 billion	US\$7.53 billion
Vietnam total exports ($X_{i,w}$)	US\$370.0 billion	US\$370.0 billion
World exports of product ($X_{w,j}$)	US\$3320 billion	US\$61 billion *
World total exports ($X_{w,w}$)	US\$25,300 billion	US\$25,300 billion
Vietnam's product/total export ratio	37.8%	2.0%
World's product/total export ratio	13.1%	0.24%
Computed RCA	2.88	8.44

* World HS 8541 export data for 2022 were not separately published in the sources consulted; the figure used is world HS 8541 import value (a standard proxy, since world imports $\approx$ world exports in aggregate). Sources: TrendEconomy (UN Comtrade mirror); World Bank WITS; WTO World Trade Statistical Review 2023 (world total exports).

Both RCA values exceed the threshold of 1, confirming genuine revealed comparative advantage. The RCA for HS 8541 (8.44) is roughly three times higher than for HS 85 overall (2.88) (see Figure 3), indicating that Vietnam's comparative advantage is especially concentrated in semiconductor/photovoltaic products—consistent with the disproportionate role of Chinese-affiliated solar manufacturers in this specific product line [1].

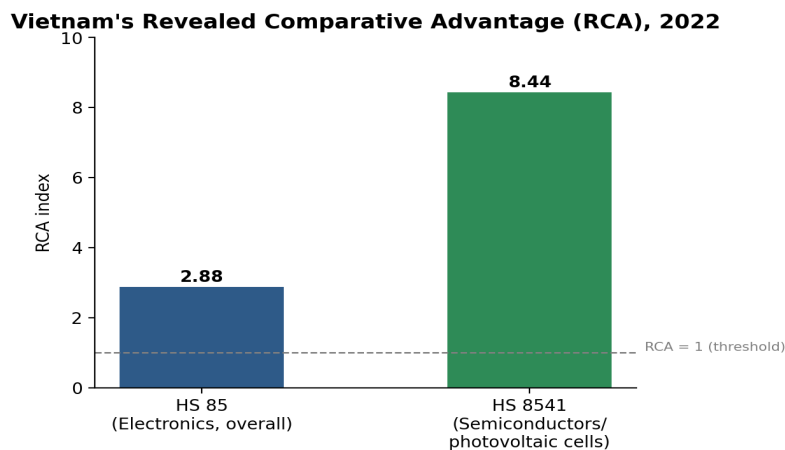


Figure 3. Vietnam's Computed RCA, 2022.

4.3. Industrial Effects

Polysilicon imports from China to Vietnam rose from 639 to 4970 metric tons between 2022 and 2023 alone (Coalition for a Prosperous America) [11], underscoring the depth of Vietnam's continued reliance on Chinese intermediate inputs even as its finished-product RCA rises (as shown in Table 2).

Table 2. Key Industrial Outcomes of inward Chinese FDI in Vietnam's Electronics and Solar-PV Sectors.

Indicator	Electronics	Solar Panels (HS 8541-Related)
Employment	>1.5 million workers	~51,000 jobs (2022); Chinese firms + suppliers ≈ half
Chinese-affiliated export share	Not separately quantified in public aggregate data	~75% of Vietnam's solar-panel exports (Ngov et al.) [1]
Localisation rate	5–10% (most segments)	Not separately quantified; import-dependent on Chinese polysilicon/wafers
Key risk	Persistent low domestic value-added	US anti-circumvention duties (US anti-circumvention trade-remedy findings (White & Case LLP) [6])

5. Discussion

Our RCA calculations offer quantitative support for qualitative claims made in earlier industry reports: Vietnam does have a strong comparative advantage in these sectors, especially in solar-photovoltaic products: Vietnam has developed genuine, not merely nominal, comparative advantage in electronics and especially in semiconductor/photovoltaic exports. This is consistent with Dunning's location-advantage logic and with Gereffi's GVC framework, under which Vietnam's persistently low localisation (5 – 10 percent) signals a downstream, assembly-oriented position within Chinese-led supply chains rather than deep indigenous technological capability [3,5,12].

These findings add empirical product-level evidence to existing literature examining RCEP's influence on FDI and regional production sharing [1]. Vietnam's RCA in HS 8541 (8.44) is markedly higher than in HS 85 overall (2.88), suggesting that RCEP's cumulative rules of origin have had their largest revealed effect in precisely the product category most exposed to Chinese input-sourcing—photovoltaic cells and modules. This is also consistent with [1], whose firm-level evidence of Chinese dominance in solar exports (75 percent) and cost advantages (38 percent cheaper panels) provides a plausible microeconomic explanation for the very high product-level RCA observed here. At the same time, the persistence of low electronics localisation despite over a decade of official targets suggests that FDI volume and FDI quality (domestic value capture) have diverged considerably—a tension this paper's RCA results, by themselves, cannot resolve, since a high RCA reflects a country's share of world trade, not the domestic value-added content of that trade.

6. Conclusions and Policy Implications

Inward Chinese FDI has driven Vietnam's rise as a major electronics and solar panel exporter, and the computed RCA values (2.88 for HS 85; 8.44 for HS 8541 in 2022) confirm this is a real, quantifiable comparative advantage rather than an artefact of trade-diversion or transshipment narratives alone. However, persistently low localisation and continued heavy reliance on Chinese intermediate inputs indicate the underlying gains remain concentrated in assembly rather than deeper value-chain participation, while escalating US trade-remedy actions pose a material risk to the durability of solar export gains specifically.

For Vietnamese policymakers: (1) strengthen supplier-development programmes and domestic-value-added incentives tied to verified outcomes rather than investment volume alone; (2) diversify export markets and strengthen rules-of-origin compliance capacity to reduce single-market trade-remedy exposure; (3) invest in workforce upskilling in semiconductor design to support upward movement in the value chain. For Chinese enterprises operating in Vietnam: ensure rigorous compliance with substantial-transformation and rules-of-origin requirements, and pursue deeper local supplier integration rather than cost arbitrage alone—both to mitigate anti-

circumvention risk and to build more resilient host-country relationships.

This study is limited by its reliance on secondary, publicly available data; the RCA computation uses the most recent year (2022) with complete, mutually consistent Vietnam and world figures, and the HS 8541 world export figure is approximated via import data in the absence of a directly published export total. Future research should extend the RCA time series using direct UN Comtrade API access, and apply gravity-model estimation to more precisely isolate RCEP's marginal contribution to FDI flows from concurrent drivers such as US–China trade tensions.

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Author Contributions

T.K.H.N was responsible for conceptualising the research idea, designing the analytical framework, and defining the scope of the study. T.K.H.N collected and compiled all secondary datasets from UN Comtrade, Vietnam General Statistics Office (GSO), and World Bank WITS, and performed the Revealed Comparative Advantage (RCA) calculations and trend analysis. T.K.H.N also interpreted the results, drafted the full manuscript, and approved the final version for submission. The author has read and agreed to the published version of the manuscript.

Institutional Review Board Statement

This study did not involve any human or animal subjects and therefore did not require ethics approval. All data used in the study were obtained from publicly available sources.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The author declares no conflict of interest. There are no financial or personal relationships that could have influenced the research presented in this manuscript.

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