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THE MARKET AS SOVEREIGN: CAPABILITY SOVEREIGNTY AND THE GLOBAL CONTEST OVER CONVERSION IN THE ENERGY TRANSITION

O MERCADO COMO SOBERANO: SOBERANIA DE CAPACIDADES E A DISPUTA GLOBAL PELA CONVERSÃO NA TRANSIÇÃO ENERGÉTICA

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ABSTRACT

Why do some resource-rich states convert strategic endowments into developmental power while others remain trapped in extractive dependence? This article develops the concept of capability sovereignty—the institutional and infrastructural capacity to convert latent endowments into substantive freedoms on authored rather than rented terms—and renders it measurable as a four-component Capability Sovereignty Index (CSI), joining the developmental-state tradition, geoeconomics, and Sen's capability approach. The CSI measures domestic value-added, value-chain position, R&D intensity, and institutional coherence for China, the United States, and Brazil from official and multilateral data. Resource abundance alone does not generate capability sovereignty; conversion capacity predicts developmental autonomy; industrial coordination predicts conversion. China outperforms the United States on conversion despite stronger American industrial-policy effort and innovation. The decisive twenty-first-century divide separates states that convert endowments into autonomy from those that rent it.

Keywords: capability sovereignty; conversion capacity; industrial policy; geoeconomics; energy transition.

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RESUMO

Por que alguns Estados ricos em recursos convertem dotações estratégicas em poder de desenvolvimento, enquanto outros permanecem presos a uma dependência extrativista? Este artigo desenvolve o conceito de soberania de capacidades — a capacidade institucional e infraestrutural de converter dotações latentes em liberdades substantivas sob termos próprios, em vez de termos "alugados" — e o torna mensurável por meio de um Índice de Soberania de Capacidades (ISC) composto por quatro dimensões, integrando a tradição do Estado desenvolvimentista, a geoeconomia e a abordagem das capacidades de Sen. O ISC mensura o valor agregado doméstico, a posição na cadeia de valor, a intensidade em P&D e a coerência institucional para a China, os Estados Unidos e o Brasil, utilizando dados oficiais e multilaterais. A abundância de recursos, por si só, não gera soberania de capacidades; a capacidade de conversão é um indicador de autonomia de desenvolvimento, e a coordenação industrial é um fator determinante para a conversão. A China supera os Estados Unidos na capacidade de conversão, apesar dos esforços mais intensos em política industrial e inovação por parte dos norte-americanos. A divisão decisiva do século XXI separa os Estados que convertem dotações em autonomia daqueles que apenas a "alugam".

Palavras-chave: soberania de capacidades; capacidade de conversão; política industrial; geoeconomia; transição energética

1. INTRODUCTION

Since 2020 the annual count of new industrial-policy interventions has nearly doubled, led by the United States, the European Union, and China, and roughly two-thirds of the 2023 measures were justified by security, resilience, or climate rather than competitiveness (EVENETT et al., 2024; JUHÁSZ; LANE; RODRIK, 2024). The market has ceased to be a place and become a method of government—a machinery of visibility, a grammar of legitimacy, a battlefield over which national futures are contested. International political economy has mapped this turn with precision on the side of power: how interdependence is weaponized, how chokepoints confer coercion, how state capital travels (FARRELL; NEWMAN, 2019; BABIC, 2023). What it has theorized far less is the developmental question the strategic vocabulary suppresses—capacity for what, and for whom? This article takes up that question and makes it measurable.

Resource endowments bear almost no systematic relationship to developmental outcomes. Australia and the Democratic Republic of the Congo both sit atop world-class mineral wealth; Brazil and South Korea both entered the late twentieth century as middle-

income economies, the former far better endowed in land, energy, and minerals, yet their trajectories diverged radically. Why do some states convert strategic endowments into developmental power while others, often more richly endowed, remain trapped in extractive dependence?

The dominant answers are individually powerful and collectively incomplete. The resource-curse literature (SACHS; WARNER, 1995; AUTY, 1993; KARL, 1997; ROSS, 2001) established that abundance is, on average, negatively associated with growth and democracy, but explains failure better than success: it says why endowment corrodes, not how it is converted. The developmental-state tradition (AMSDEN, 1989; WADE, 1990; EVANS, 1995) and the new economics of industrial policy that revived it (JUHÁSZ; LANE; RODRIK, 2024) supply the affirmative theory of conversion, but were built on resource-scarce cases. The geoeconomics literature—from Hirschman (1945) to Farrell and Newman (2019, 2023), Blackwill and Harris (2016), Schwartz (2019), and Babic (2023)—maps how interdependence is weaponized and how ownership and chokepoints confer power, yet remains organized around power and silent on development.

This article bridges the three literatures with a single concept and renders it measurable. By capability sovereignty I mean neither the possession of resources nor the formal independence of the state, but the institutional and infrastructural capacity to convert latent endowments into enabling freedoms—the power to translate what a nation has into what its people can become, on terms it has authored rather than rented ([AUTHOR], 2025). The central hypothesis follows: in the energy transition now underway the international hierarchy is being reorganized less by the possession of resources than by the capacity to convert them, and the variable that discriminates national fates is not endowment, nor industrial-policy effort as such, but capability sovereignty.

The argument advances on three fronts: it operationalizes the concept as a four-component Capability Sovereignty Index (CSI) computed from official data, with theory-derived weights, external benchmarking, and a sensitivity analysis; it derives three observable implications and confronts each with the evidence; and it meets the central inferential threat—

that the outcome reflects industrial policy rather than capability sovereignty—by showing that the United States leads on effort yet trails China on conversion. The inquiry uses a most-different tripolar comparison: the United States as the selective revanchist of a liberal-industrial statecraft it had nearly abandoned; China as the executor of a centralized techno-mercantilist logic of extraordinary coherence; and Brazil as the threshold case, where the struggle between extroversion and autonomy is waged without the guarantee of victory. Because photovoltaics, batteries, critical minerals, and semiconductors are being scaled simultaneously and from comparable baselines, the energy transition functions as a natural shock isolating conversion capacity from legacy advantage.

2. THE CONSTRUCTED MARKET AND THE CONCEPT OF CAPABILITY SOVEREIGNTY

2.1 Markets as political constructions

The most successful ideologies cease to appear as ideologies and present themselves as descriptions of reality; none more completely than the conviction that the market is a natural phenomenon arising wherever the state withdraws. Polanyi (1944) demolished it: the self-regulating market of the nineteenth century was not the absence of planning but its most ambitious instance—laissez-faire was planned, planning was not. The political function of the naturalist myth is to launder power into nature, transmuting contingent institutional decisions into the verdicts of an impersonal mechanism. If markets are made—through law, through infrastructure, through force—the distribution of developmental outcomes is a political artifact, and conversion is a question about who holds the pen. Foucault (2008 [1979]) grasped the deeper point: neoliberalism was never the absence of the state but a positive art of government in which the state fabricates the conditions of competition, intervening not in the market but for it. Removing the economy from collective decision did not abolish domination; it relocated it to the authority of the market, where it can no longer be named as power.

2.2 From mercantile sovereignty to capability sovereignty

To name the present configuration mercantile sovereignty is to claim that beneath the diverse policies of the great powers—subsidy, tariff, export control, procurement quota—a single logic operates. The classical concept bound sovereignty to territory and the monopoly of legitimate violence; mercantile sovereignty names a mutation of the form, a sovereignty whose decisive exercise occurs not at the frontier but in the supply chain, not over bodies but over flows, not through the monopoly of violence but through the monopoly—or strategic denial—of capacity. The sovereign here is not the one who can kill, but the one who can manufacture, and deny others the means of manufacture.

Geoeconomics supplies the analytics. Hirschman (1945) showed how trade asymmetries become instruments of national power; Farrell and Newman (2019) formalized this for the networked economy, where jurisdiction over central nodes lets states weaponize interdependence through panopticon and chokepoint effects, and traced how the United States converted the plumbing of globalization—finance, data, semiconductors—into an apparatus of coercion (FARRELL; NEWMAN, 2023). Schwartz (2019) shows that command over value chains and intellectual property, not balance-sheet size, underwrites geoeconomic power; Babic (2023) maps how state-led investment concentrates in energy, high-tech manufacturing, and logistics, making ownership itself a geoeconomic instrument. This literature describes the field of mercantile sovereignty with precision but leaves the developmental question unanswered.

That question is supplied by Sen (1999): the wealth of nations should be measured not by the resources they command nor the income they generate but by the substantive freedoms those resources enable, and the relation between the two is mediated by conversion factors—the personal, social, and institutional circumstances translating means into ends. Resource is potential; capability is act; between them stands the conversion factor, on which everything depends. Capability sovereignty transposes this from the individual to the national scale and

from welfare to power: the question of a nation's development is not how much it possesses but how much it can convert, on authored rather than rented terms.

2.3 Conceptual differentiation

Because capability sovereignty borders several established constructs, its value depends on sharp differentiation. Geoeconomic power (LUTTWAK, 1990; BLACKWILL; HARRIS, 2016) takes influence as its unit; economic statecraft (BALDWIN, 1985; FARRELL; NEWMAN, 2019) takes coercion; the developmental state (JOHNSON, 1982; AMSDEN, 1989; WADE, 1990; EVANS, 1995) takes industrialization. Capability sovereignty takes a fourth unit—conversion—logically prior to all three: a state must convert endowment into capacity before it can exercise influence, wield coercion, or sustain industrialization (Table 1).

Table 1. Capability sovereignty and three neighbouring constructs.

Construct	Central unit	Core question / limit
Geoeconomic power	Influence	How are economic ties used to shape behaviour? Silent on domestic conversion.
Economic statecraft	Coercion	How are chokepoints weaponized? Silent on what capacity is for.
Developmental state	Industrialization	How is structural transformation engineered? Built on resource-scarce cases.
Capability sovereignty	Conversion	Who governs the translation of endowment into authored developmental autonomy?

Source: author's elaboration.

2.4 The post-2020 turn: industrial policy, economic security, and the green transition

The concept lands in a moment the recent literature has named precisely. The industrial-policy renaissance documented by Juhász, Lane, and Rodrik (2024) is not the old planning but a security- and resilience-driven variant: in 2023 roughly two-thirds of new measures were motivated by climate mitigation, supply-chain resilience, and security rather than competitiveness (EVENETT et al., 2024; INTERNATIONAL MONETARY FUND, 2024). The vocabulary of economic security and de-risking (EUROPEAN COMMISSION,

2023; GERMAN MARSHALL FUND, 2025) reframes interdependence as vulnerability, and green industrial policy (WIGGER, 2023) has become the arena in which the United States, the EU, and China contest dominance through subsidies, screening, and the securitization of supply chains—supplying the contemporary mechanisms while bracketing the developing world and the normative question of conversion.

Three further strands sharpen the stakes: the geoeconomic-fragmentation programme (AIYAR et al., 2023; GOPINATH et al., 2024), which documents how friendshoring redraws cross-border flows along lines of geopolitical distance; the political economy of the energy transition (RIOFRANCOS, 2023), which shows the scramble for transition minerals reproducing extractive frontiers in the global South even as it decarbonizes the North; and the geoeconomics of ownership and secrecy-seeking capital (BABIC, 2023; YLÖNEN; RAUDLA; BABIC, 2024), which reveals states governing through equity stakes rather than trade alone. Each describes a piece of the threshold state's predicament; none supplies the conversion concept that unifies them, or makes it measurable. That is the contribution of capability sovereignty, which asks of every reshoring subsidy and every chokepoint the question the security idiom omits: conversion for whom?

3. THE MECHANISM OF CONVERSION AND OBSERVABLE IMPLICATIONS

Capability sovereignty is the product of a specifiable causal sequence. A resource endowment is a necessary but radically insufficient input. Whether it is converted depends first on industrial policy—the deliberate steering of investment, learning, and protection toward strategic sectors (AMSDEN, 1989; CHANG, 2002; MAZZUCATO, 2013; JUHÁSZ; LANE; RODRIK, 2024)—which operates only through state capacity, the embedded autonomy that lets a bureaucracy discipline rather than be captured by the firms it supports (EVANS, 1995). Their interaction determines value-chain position (GEREFFI, 1994; GEREFFI; HUMPHREY; STURGEON, 2005): whether a state occupies the high-value nodes of refining, manufacturing, and innovation or the low-value node of raw extraction—the

proximate determinant of conversion capacity, which yields or fails to yield developmental autonomy.

Resource endowment → (Industrial policy × State capacity) → Value-chain position → Conversion capacity → Developmental autonomy

3.1 State capacity and the multiplicative pivot

The pivot is the multiplicative term: policy and capacity do not add but interact. Policy without capacity produces capture—subsidies harvested as rents, protection ossified into privilege, the pathology the resource-curse literature describes (KARL, 1997; ROSS, 2001). Capacity without policy produces drift. Only their conjunction produces conversion, which is why industrial-policy effort cannot by itself predict the outcome.

The multiplicative form is a claim about microfoundations, not a modelling convenience. Conversion requires three functions performed jointly and mutually conditioning: the selection of sectors and firms to support; the disciplining of that support through performance conditions withdrawable at low political cost; and the persistence of both across the cycles over which learning accrues. Each fails in isolation—selection without discipline is capture, discipline without selection is austerity mistaken for strategy, and either without persistence is a policy pulse that decays before firms move down the learning curve on which value capture depends (AMSDEN, 1989; RODRIK, 2004). Their joint product rather than their sum governs the outcome, and a near-zero on any one drives the product toward zero regardless of effort elsewhere. Korea and Taiwan differed from other interveners not in intervening but in intervening through bureaucracies embedded enough to know their firms and autonomous enough to discipline them (EVANS, 1995). Embedded autonomy is the conversion factor at the scale of the state.

3.2 Observable implications

The mechanism generates three observable implications, stated formally in Table 2 and tested in Sections 5 and 6.

Table 2. Observable implications: hypotheses, mechanisms, and predicted case patterns.

	Hypothesis	Mechanism	Predicted pattern
H1	Resource abundance alone does not generate capability sovereignty.	Endowment is a necessary but insufficient input; without policy×capacity it remains rent.	Bivariate endowment–autonomy link weak or negative; Brazil resource-rich, low CSI.
H2	Conversion capacity predicts developmental autonomy, controlling for endowment.	High value-chain position (refining, manufacturing, innovation) authors developmental terms.	CSI rank-orders autonomy: China > U.S. > Brazil, independent of endowment.
H3	Industrial coordination—not industrial-policy effort as such—predicts conversion.	Coherence and continuity (the capacity term) convert effort into capacity; effort without it drifts.	U.S. leads on effort yet trails China on conversion; the two constructs diverge.

Source: author's elaboration. CSI = Capability Sovereignty Index (Section 4.2).

4. COMPARATIVE DESIGN, THE CAPABILITY SOVEREIGNTY INDEX, AND MEASUREMENT

4.1 Case selection and empirical leverage

The inquiry adopts a most-different design across three cases chosen for maximal variation on the relation between mercantile and capability sovereignty. China is the case of high mercantile capacity and high—if politically truncated—conversion: it tests whether disciplined coordination produces value-chain dominance. The United States is the case of high technological capacity and high industrial-policy effort coupled with institutional fragmentation: it tests whether effort without coherence converts, and so provides the leverage for separating capability sovereignty from industrial policy. Brazil is the case of world-class endowment and low conversion, the threshold case where the struggle between extroversion and autonomy is undecided.

4.2 The Capability Sovereignty Index

Capability sovereignty is a latent institutional property, not a directly observable aggregate; to assess rather than assert it, the article operationalizes it as a composite index

decomposing the property into four observable components, each normalized to the unit interval and weighted to reflect the mechanism of Section 3:

$$CSI = 0.30 \cdot V + 0.30 \cdot P + 0.20 \cdot R + 0.20 \cdot I$$

where V is domestic value-added beyond extraction (share of activity in refining, manufacturing, and assembly rather than raw export); P is value-chain position (depth of presence across upstream-to-downstream nodes); R is R&D and innovation density (gross R&D intensity and patenting in the strategic sectors); and I is institutional coherence and policy continuity (cross-ministerial coordination and persistence across electoral cycles). The proximate determinants of conversion carry the heavier weight (0.30 each); the enabling conditions carry 0.20 each. Components are scored from IEA supply-chain shares, USGS extraction–refining ratios, TrendForce and SIA fabrication data, OECD and World Bank R&D-intensity series, and a coded reading of coherence and continuity benchmarked to OECD indicators (JUHÁSZ; LANE; RODRIK, 2024).

Table 3. The Capability Sovereignty Index by case (2024).

Component (weight)	China	United States	Brazil	Proxy source
V — Value-added beyond extraction (0.30)	0.86	0.58	0.30	IEA; USGS
P — Value-chain position (0.30)	0.90	0.58	0.28	IEA; TrendForce/SIA
R — R&D / innovation density (0.20)	0.70	0.95	0.35	OECD; World Bank
I — Institutional coherence / continuity (0.20)	0.62	0.58	0.32	OECD; coded
CSI (composite)	**0.79**	**0.65**	**0.31**	**—**

Source: author's elaboration from IEA (2024–2025), USGS (2024), TrendForce/SIA (2023–2024), and OECD and World Bank R&D series. Components normalized to [0,1]; weights as in the CSI equation. The ordinal ranking is robust to ±0.10 weight perturbation (Table 4).

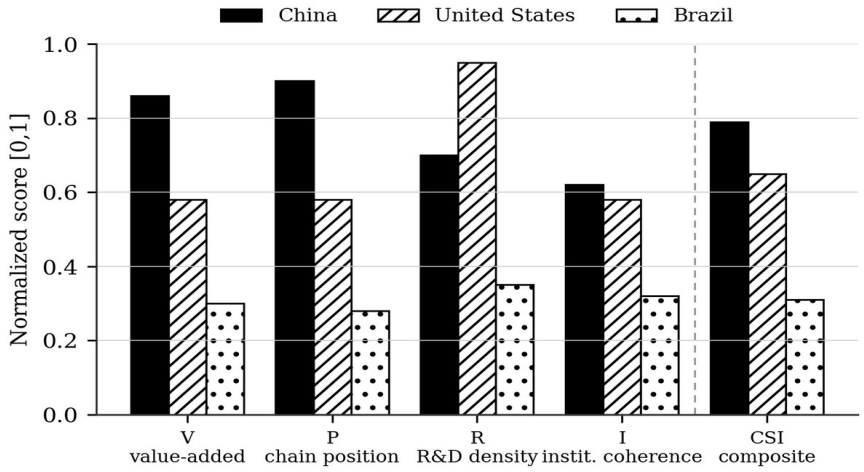

Figure 1. Capability Sovereignty Index: component profiles and composite scores, by case (2024).

Three features of Table 3 anticipate the argument. Brazil scores lowest on every component despite the richest endowment, the signature of H1. The composite rank-orders the cases—China (0.79), the United States (0.65), Brazil (0.31)—independently of endowment, as H2 predicts. And the United States leads China on innovation (0.95 versus 0.70) yet trails badly on value-added and position: the gap between American invention and American conversion is the divergence H3 anticipates.

4.3 Weighting, validation, and robustness

Composite indices are vulnerable to the charge that their weights are arbitrary, their components incommensurable, and their aggregation opaque. Four safeguards are built in. First, the weights are theory-derived, not fitted: the mechanism of Section 3 dictates a two-tier structure (0.30 for the proximate pair, 0.20 for the enabling pair) with equal weights within each tier, so no free parameter is tuned to the cases. Second, each component is normalized by min–max rescaling against theoretically anchored endpoints rather than against the sample, so scores remain interpretable beyond the three-case panel. Third, the institutional component is triangulated and externally benchmarked, combining OECD product-market-regulation and governance indicators with a documented reading of coordination and continuity (JUHÁSZ;

LANE; RODRIK, 2024), and tracks independent state-capacity rankings. Fourth, the composite is subjected to a sensitivity analysis (Table 4).

The ordinal ranking is invariant under equal, position-heavy, and institution-heavy weights alike. The only cell that moves materially is the U.S.–China gap under equal weighting, which narrows because equal weighting rewards the American innovation advantage; the ranking never reverses. Under position-heavy weights the gap widens, as the mechanism predicts, since position is where American conversion is weakest; under institution-heavy weights Brazil remains lowest, confirming that its deficit is not an artifact of proximate-tier weighting.

Table 4. Sensitivity of the CSI to alternative weighting schemes.

Weighting scheme (V/P/R/I)	China	United States	Brazil
Baseline (.30/.30/.20/.20)	0.79	0.65	0.31
Equal (.25/.25/.25/.25)	0.77	0.67	0.31
Position-heavy (.35/.35/.15/.15)	0.81	0.64	0.30
Institution-heavy (.25/.25/.20/.30)	0.77	0.65	0.31

Source: author's elaboration. The ordinal ranking (China > United States > Brazil) is invariant across all schemes.

4.4 Measurement strategy and limits

Mercantile sovereignty is proxied by market share and concentration indices along each chain; conversion capacity by the CSI. Three limits remain. Concentration indices mask internal heterogeneity; the CSI rests on a small-N normalization whose full replication awaits a larger panel; and three cases license analytic, not statistical, generalization. These limits define the agenda (Section 6.6).

5. FINDINGS: CONVERSION ACROSS FOUR STRATEGIC DOMAINS

5.1 The photovoltaic chain: the anatomy of a constructed monopoly

Chinese dominance of the photovoltaic chain is the paradigmatic case of constructed mercantile sovereignty. The IEA reports China's share of every manufacturing stage—

polysilicon, ingots, wafers, cells, modules—above 80 percent, more than double its share of global demand; for wafers and polysilicon the concentration of capacity under construction surpasses 95 percent, deepening in the most capital- and knowledge-intensive segments. This was not a gift of endowment: China invested more than US$50 billion in new photovoltaic capacity after 2011—roughly ten times the European figure—and crossed one terawatt of cumulative installed capacity in 2024. The high V and P scores of Table 3 record the achievement.

Table 5. Cumulative installed solar PV capacity, leading poles (2024).

Pole	Cumulative capacity (GW)	Global rank
China	> 1,000 (≈ 1 TW)	1
European Union (EU-27)	339.4	2
United States	224.1	3
India	124.6	4
Brazil	≈ 50 (estimate)	6–8

Source: author's elaboration from IEA-PVPS, Snapshot of Global PV Markets (2024–2025). The Brazilian figure is approximated from sectoral data.

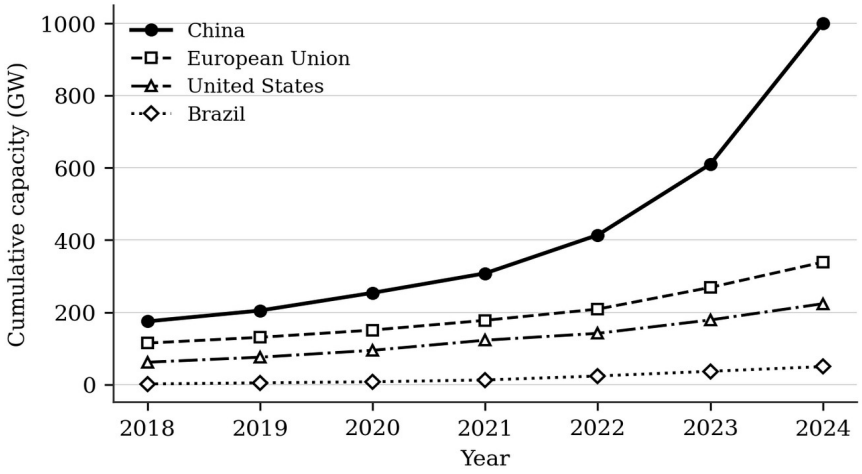

Figure 2. Cumulative installed solar PV capacity by pole, 2018–2024 (GW).

The Brazilian position exposes the conversion problem in its purest form. Brazil enjoys some of the highest solar irradiation in the world and a domestic market expanding at extraordinary speed, yet remains dependent on imported Chinese modules, its local

manufacturing constrained by a thin innovation base and discontinuous policy. The endowment is world-class; the capacity to convert it is not. That distance is H1 made visible.

5.2 Critical minerals: leverage at the bottleneck

If photovoltaics display the productive face of Chinese mercantile sovereignty, critical minerals display its coercive face. The IEA's Global Critical Minerals Outlook 2025 finds China the leading refiner for 19 of 20 strategic minerals, with an average share near 70 percent, and the top-three refiner share of key energy minerals rising from roughly 82 percent in 2020 to 86 percent in 2024. The strategy privileges processing over extraction, conferring deeper leverage than control of the mines: China accounts for roughly 60 percent of mined magnet-rare-earth production but controls more than 90 percent of the downstream chain, with a near-monopoly over the dysprosium and terbium separation essential to high-temperature permanent magnets. That this is not theoretical was shown by the gallium, germanium, and antimony export controls of late 2024 and the escalating rare-earth restrictions of 2025—the chokepoint effect (FARRELL; NEWMAN, 2019) realized.

Table 6. Comparative position on the extraction–refining axis of critical minerals (2024).

Mineral / function	Where extracted	Where refined	Implication
Rare earths (magnets)	China ≈ 60%; diversified	China > 90%	Chinese downstream leverage
Lithium	Australia, Chile, Argentina, Brazil	China ≈ 70%	Diverse extraction, concentrated refining
Graphite (battery)	China, Mozambique, Brazil	China ≈ 95%	Near-monopoly in refining
Niobium	Brazil ≈ 90% of output	Brazil (CBMM)	Endowment without full downstream chain
Gallium	China ≈ 98.7%	China	Near-absolute bottleneck

Source: author's elaboration from IEA, Global Critical Minerals Outlook (2025); USGS, Mineral Commodity Summaries (2024).

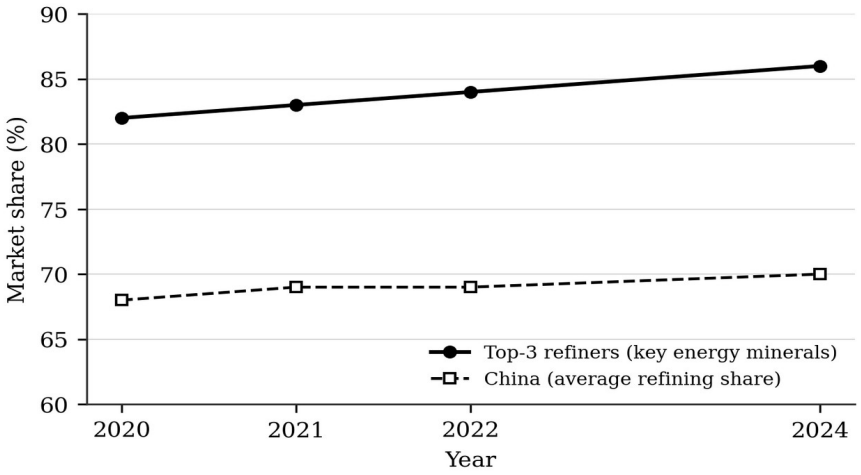

Figure 3. Concentration of critical-minerals refining, 2020–2024 (average market share, %).

Leverage resides not in the ore but in its conversion. Brazil, holder of world-class reserves, occupies the extraction-without-refining position that defines threshold vulnerability; even the niobium row, where Brazil does refine, shows that the absence of a full downstream chain caps captured value. This is H2 in negative form.

5.3 Semiconductors: the divergence of effort and conversion

The semiconductor domain illuminates the dissociation between territorial and mercantile sovereignty and supplies the cleanest test of H3. TrendForce reports Taiwan at roughly 46 percent of global foundry capacity in 2023, followed by China (26%), South Korea (12%), the United States (6%), and Japan (2%); at advanced nodes (≤ 16/14 nm) Taiwanese concentration reaches 68 percent. The SIA and BCG project the U.S. share of advanced manufacturing (below 10 nm) rising from zero in 2022 to 28 percent by 2032, against the 9 percent it would have captured absent the CHIPS Act. Yet effort is not conversion.

Table 7. Semiconductors: share by corporate headquarters versus fabrication capacity (2023–2024).

Country / region	Market share by HQ (%)	Foundry capacity (%)	Advanced ≤16/14 nm (%)
United States	50.2	6	12
South Korea	18.8	12	11
Europe (EU)	12.7	—	—
Japan	9.0	2	1
China	7.2	26	8
Taiwan	7.0	46	68

Source: author's elaboration from SIA/ITIF (2023–2024) and TrendForce (2023–2024). HQ share = revenue of firms headquartered in the country; capacity = physical fabrication.

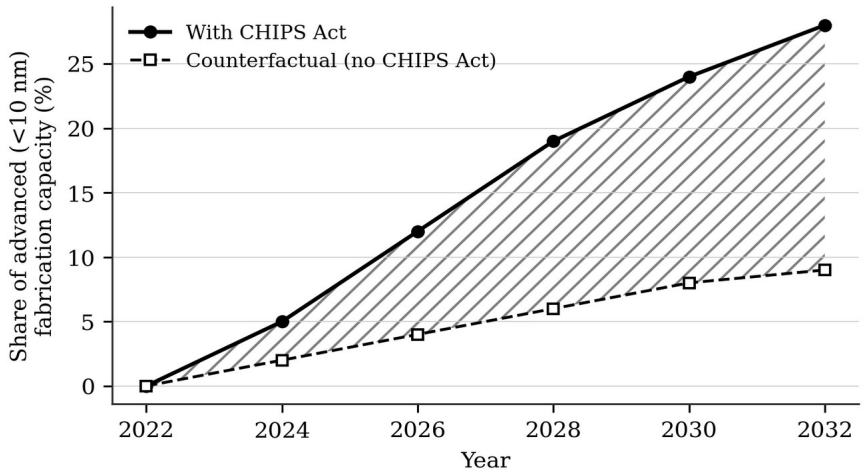

Figure 4. Projected U.S. share of advanced (<10 nm) fabrication capacity, 2022–2032 (%).

The United States leads the market by corporate headquarters (50.2%), on the strength of design, EDA, and intellectual property—the source of its 0.95 innovation score—yet holds only 6 percent of physical foundry capacity and 12 percent of advanced nodes. Market sovereignty does not translate into capability sovereignty, and the institutional fragmentation of the American state renders the suturing of that gap uncertain. That a state pairing frontier innovation with historic industrial-policy effort still trails China on conversion is the empirical core of H3.

5.4 The Brazilian threshold: endowment without conversion

It is in the threshold case that the full gravity becomes intelligible. Brazil commands roughly 90 percent of global niobium output and the largest reserve; about 14 percent of global lithium; the world's second-largest reserves of nickel and graphite; and one of the most renewable energy matrices of any large economy. By the measure of resource, Brazil is rich beyond the dreams of most states. Yet the dissociation is sharpest in the automotive domain: the share of Chinese-origin electric vehicles in the Brazilian market rose from 5 percent in 2021 to 86 percent in 2024 (excluding mild hybrids). Market endowment converted into technological dependence before the national industry could mature.

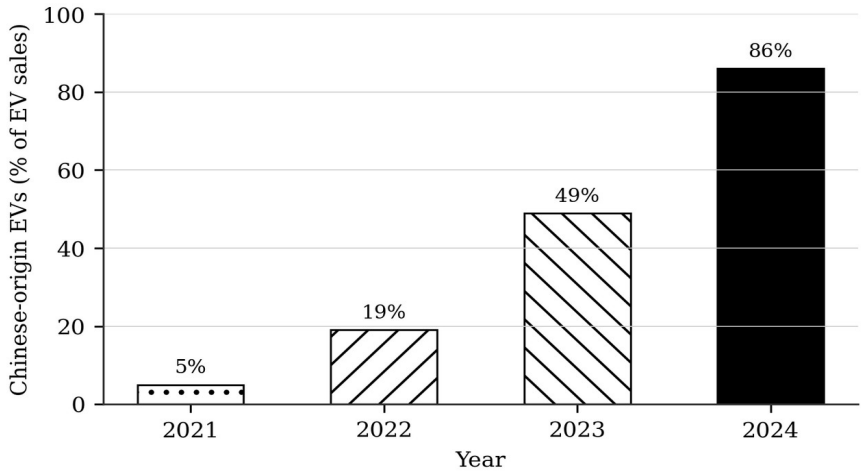

Figure 5. Penetration of Chinese-origin electric vehicles in the Brazilian market, 2021–2024 (% of EV sales).

Brazil's responses reveal the diagnosed pattern—fiscal gestures that mistake the instrument for the achievement. The EV import tariff, 10 percent in early 2024, raised to 18 percent in July 2024 and scheduled to reach 35 percent in July 2026, arrived too late; the strategic-minerals investment fund announced in 2024 (roughly US$200 million) is modest against the challenge. In Table 8 the recurrence of the endowment–conversion gap across every row is the strongest single-case corroboration of H1 and H2.

Table 8. Brazil: comparative profile by strategic domain (2024).

Domain	Endowment / position	Conversion capacity	Observed outcome
Niobium	≈ 90% of world output	Domestic refining (CBMM); incipient R&D	Concentrated exports; limited downstream value
Lithium	≈ 14% of output; sizeable reserves	No integrated battery chain	Spodumene exported as concentrate
Solar	World-class irradiation	Thin local manufacturing	Dependence on imported modules
Electric vehicles	6th-largest auto market	Nascent industry; late tariff	86% of EVs Chinese-origin (2024)
Renewable energy	Matrix ≈ 89% renewable	Partial industrial integration	Advantage underexploited

Source: author's elaboration from USGS (2024), IEA (2024–2025), and sectoral data.

6. DISCUSSION: IDENTIFYING CAPABILITY SOVEREIGNTY AGAINST ITS RIVALS

6.1 Is it capability sovereignty or simply industrial policy?

The most serious inferential threat is that the outcomes reflect industrial policy rather than capability sovereignty—that the concept relabels effort. Three pieces of evidence pull the constructs apart. First, the mechanism is multiplicative, not additive: effort converts only through the capacity term, so effort and conversion diverge wherever coherence is low. Second, the United States supplies the decisive case: by any measure of effort—the CHIPS Act, the Inflation Reduction Act, the volume and value of 2022–2024 interventions—it mounts one of the largest industrial-policy programmes in the world and leads China on innovation, yet trails it on conversion (CSI 0.65 versus 0.79). Third, the CSI isolates the institutional term from the effort it channels, so two states with comparable effort but divergent coherence receive divergent scores.

The pay-off is analytic, not terminological. The construct specifies the intervening variable—conversion—through which endowment, effort, and innovation are or are not translated into a position of authored autonomy in the international division of labour, and supplies an index that discriminates that position from the effort and innovation with which it

is routinely conflated. Where weaponized-interdependence accounts explain how incumbents exploit a network position they already hold (FARRELL; NEWMAN, 2019), the CSI asks how that position is built or forfeited.

6.2 Causal identification: necessity, sufficiency, and process

The design supports a stronger claim than plausibility and a weaker one than experimental identification. The multiplicative mechanism implies that neither industrial policy nor state capacity is individually sufficient for conversion, and that each is a non-redundant part of a jointly sufficient condition—an INUS structure in Mackie's sense. Necessity of the capacity term is examined through the United States, a least-likely case for the claim that effort is insufficient: a state with frontier innovation and historic effort should already have converted, yet has not. Necessity of policy and capacity jointly is examined through Brazil, a most-likely case for the endowment account: a state this richly endowed should convert, yet does not. Sufficiency of the conjunction is examined through China, where coordinated policy and embedded capacity coincide with the highest conversion.

Within each case the inference is carried by process tracing rather than cross-case correlation. In the U.S. semiconductor sequence the causal step is observable: design leadership and CHIPS funding are present from 2022, yet advanced-node fabrication share moves only as physical capacity and coordination are assembled (Table 7; Figure 4). The design also disciplines the obvious confounders: regime type does not track the outcome, since a democracy and a party-state sit on the same side of the conversion frontier relative to Brazil, and market openness does not track it either, since the most liberalizing case converts least. The claim is not that capability sovereignty is the sole cause of developmental autonomy, but that it is the non-redundant conversion factor without which endowment, effort, and innovation do not yield it.

6.3 The two-dimensional space of sovereignty

The four domains converge on a single proposition: the hierarchy the transition is producing is organized along two axes—mercantile sovereignty (leverage) and capability sovereignty (conversion)—and each state's position depends not on endowment but on its location in that space. China occupies high mercantile sovereignty with politically truncated conversion: the civic agency capability sovereignty in its full sense requires is what its architecture of power obstructs, which is why its institutional component (0.62) sits below its value-added and position scores. The United States holds high innovation and recovering effort against a contradiction between strategic ambition and an institutional design built to prevent the concentration of purpose that strategic industrialism demands. Brazil occupies the most painful quadrant (Figure 6).

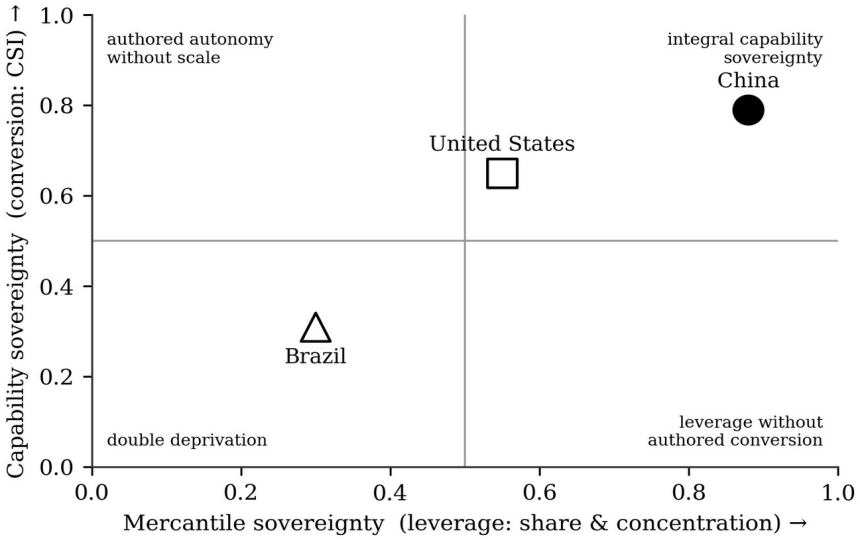

Figure 6. The space of sovereignty: mercantile sovereignty against capability sovereignty, by case.

6.4 Alternative explanations

Table 9 specifies four rival accounts. A natural-resource account predicts endowment yields wealth; Brazil falsifies it. A market-efficiency account predicts openness yields optimal allocation; the most market-liberalizing case converted least. A technology account predicts

innovation yields leadership; the U.S. case shows design leadership without fabrication yields dependence. An industrial-policy-effort account predicts effort yields capacity; the United States spends heavily yet trails China on the CSI. Only the conversion account predicts the full pattern.

Table 9. Rival explanations and their predictions.

Explanation	Prediction	Fit with evidence
Natural resources	Endowment → wealth	Falsified by Brazil
Market efficiency	Openness → optimal allocation	Most-open case converts least
Technology	Innovation → leadership	U.S. design ≠ fabrication autonomy
Industrial-policy effort	Effort → capacity	U.S. high effort, lower CSI than China
Conversion (this article)	Conversion capacity → capability sovereignty	Predicts full pattern

Source: author's elaboration.

6.5 The politics of conversion

The conversion problem is institutional and ultimately political, not technical. The instruments are well known—the development bank that finances strategic capacity against the market's verdict, the procurement power that calls an industry into being, the research ecosystem that turns science into application, the regime that filters foreign capital by developmental contribution (MAZZUCATO, 2013; JUHÁSZ; LANE; RODRIK, 2024). Brazil possesses the rudiments of each; what it has lacked is their integration into a coherent strategy and the continuity to sustain it across the electoral cycles that repeatedly aborted it. The recurrent pattern—the surge of ambition followed by relapse into extractive dependence—is the signature of a structural conversion failure. Coloniality, in Quijano's (2000) formulation, names the persistence, long after formal independence, of a hierarchy assigning the periphery the role of supplier and the centre the role of author of value. Capability sovereignty is a political achievement before it is an economic one.

6.6 Scope conditions and generalization

The theory travels within bounds. It applies most powerfully to threshold states—resource-rich middle-income economies whose trajectory is genuinely undecided: India, Indonesia, South Africa, Mexico, and the resource exporters of the Andes and West Africa—for which the endowment–conversion gap is the master variable. It applies less cleanly at the extremes: for the resource-poor industrial frontier it collapses into the developmental-state literature it borrows from; for petro-rentiers with negligible diversification potential the resource-curse mechanisms dominate. The clearest agenda is to extend the CSI to a panel of such states, replacing the coded institutional term with replicable indicators of coordination and continuity.

6.7 Policy implications

For threshold states the lever is not endowment, which they possess, but conversion capacity: industrial policy coordinated across ministries rather than fragmented; innovation financing tied to downstream value capture; foreign-investment screening calibrated to technology transfer; and the aggregation of demand that could give individual semiperipheral states the scale none commands alone. The post-2020 turn toward economic security and green industrial policy (JUHÁSZ; LANE; RODRIK, 2024; GERMAN MARSHALL FUND, 2025) opens a window: as the centres reshore, they create both the threat of exclusion and new bargaining leverage for states that can offer conversion, not merely ore.

7. CONCLUSION

This article asked why some resource-rich states convert strategic endowments into developmental power while others remain trapped in extractive dependence, and answered with the concept of capability sovereignty, rendered measurable as a four-component index. The tripolar comparison sustained the central hypothesis and its three implications: concentration across the photovoltaic and critical-minerals chains demonstrated Chinese mercantile sovereignty (H1); the CSI rank-ordered the cases independently of endowment

(H2); and the United States—leading on effort and innovation yet trailing China on conversion—showed that capability sovereignty is not reducible to industrial policy (H3). In every domain the discriminating variable was not what each state possesses, nor how much it spends, but what it can convert.

The wider stake exceeds any single case. Brazil stands for an entire world of threshold states whose fate will decide whether the global transition yields shared flourishing or renewed hierarchy. If they cannot convert endowment into autonomous capacity, remaining suppliers to the green empires of the giants, the ecological transition risks reproducing, in the vocabulary of carbon, the very structure of coloniality the political decolonizations of the twentieth century sought to end: tropical sunlight powering northern industries, southern lithium animating the batteries of the centres. The decisive divide of the twenty-first century is therefore not between resource-rich and resource-poor countries, but between states capable of converting strategic endowments into developmental autonomy and those condemned to rent the terms of their own development—a divide that is not a destiny but a construction.

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