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Measuring Human Capabilities Across Regimes: A Sen-Nussbaum Composite Index

Construction, Validation, and Application of a 15-Indicator Human Capabilities Index for Cross-Regime Comparison

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ABSTRACT

We construct a 15-indicator Human Capabilities Index (HCI) grounded in the Sen-Nussbaum capability approach, covering seven domains: Survival and Longevity, Maternal and Child Health, Knowledge and Education, Material Living Standard, Psychological Well-being, Basic Infrastructure, and Agency and Equality. The index covers 91 countries with data points spanning 1800–2025, yielding 3,479 populated observations across 13 benchmark years. We document the complete construction methodology, including a strict "no interpolation, no fabrication" data protocol in which missing observations are recorded as missing rather than imputed, in contrast to the standard practice of most composite indices. Validation against the UNDP Human Development Index produces a Pearson correlation of $r = 0.92$, confirming convergent validity while demonstrating that the HCI captures capability dimensions absent from the HDI. We use the index to classify countries into four quadrants defined by capability and freedom thresholds (HCI = 70, Liberty = 60): Free and Capable (38 countries), Capable Autocracy (39 countries), Free but Struggling (6 countries), and Neither (8 countries). The emergence of Capable Autocracies as a modal category—equalling Free and Capable states for the first time in recorded history—represents a direct empirical challenge to modernization theory. The HCI enables testing of this prediction at the capability level, documenting a secular decline in the Liberty-Capability correlation from $r = 0.79$ (pre-1900) to $r = 0.57$ (post-1990). Sensitivity analysis via geometric mean aggregation, leave-one-domain-out jackknife, and bootstrap resampling confirms the robustness of these findings. The index is currently at 27% completion (4 of 15 indicators fully populated), with a defined pipeline for the remaining 11 indicators.

Keywords: capability approach, composite index, human development, regime type, modernization theory, cross-national measurement, Sen-Nussbaum framework

JEL codes: I31, O15, P16

1. Introduction

The measurement of human well-being is among the oldest and most consequential challenges in the social sciences. Since Amartya Sen's (1985, 1999) reconceptualization of development as "freedom," and Martha Nussbaum's (2000, 2011) elaboration of central human capabilities, a broad consensus has emerged that income alone is an inadequate measure of human flourishing. Yet the operationalization of this insight into cross-nationally comparable indices has lagged behind the theoretical advance. The UNDP Human Development Index (HDI), introduced in 1990 following Anand and Sen's (1994) foundational work, remains the most widely used measure of human development, but it captures only three dimensions—health, education, and income—and has been criticized for its narrow scope relative to the capability framework that inspired it (Alkire, 2002; Robeyns, 2005; Ranis, Stewart, and Samman, 2006).

This paper introduces the Human Capabilities Index (HCI), a 15-indicator composite measure organized across seven domains that more fully operationalizes the Sen-Nussbaum

capability approach. The index is constructed within the Political Topology project at Cambridge Governance Labs, which maintains a parallel database of political liberty scores for the same 91 countries over the same temporal span (1800–2025). This parallel construction enables a direct test of one of the most influential claims in political science: modernization theory's prediction that rising capabilities will produce political liberalization (Lipset, 1959; Rostow, 1960; Inglehart, 1997; Fukuyama, 1992).

The paper makes four contributions. First, we construct the first composite capability index explicitly covering 15 dimensions drawn from the Sen-Nussbaum framework, extending well beyond the HDI's three dimensions to include maternal and child health, psychological well-being, basic infrastructure, and agency and equality. Second, we implement a "no fabrication" data protocol in which missing data are recorded as missing rather than interpolated or imputed, a departure from the standard practice of most composite indices that has implications for the integrity of historical comparisons. Third, we develop a quadrant classification system based on dual thresholds—HCI = 70 for capability and Liberty = 60 for freedom—that enables direct testing of modernization theory predictions. Fourth, the index's long-run coverage (225 years across 13 benchmark years) enables trajectory analysis that reveals the historical evolution of the capability-freedom relationship.

Our central empirical finding is a secular decline in the correlation between human capabilities and political liberty, from $r = 0.79$ in the pre-1900 era to $r = 0.57$ in the post-1990 era. By 2023, 39 countries qualify as "Capable Autocracies"—states that deliver HCI scores above 70 while maintaining Liberty scores below 60. This number equals the 38 "Free and Capable" democracies, a parity that has never previously obtained in the dataset. These findings challenge the assumption that human development and political freedom are inseparable components of a unified modernization process.

2. Literature Review

2.1 The Capability Approach: Theoretical Foundations

The capability approach originated in Sen's (1980) critique of utilitarian and Rawlsian frameworks for evaluating well-being. Rather than measuring welfare through utility or primary goods, Sen (1985, 1999) proposed that the appropriate evaluative space is that of "capabilities"—the real freedoms that people have to achieve lives they value. A capability represents the substantive opportunity to achieve a particular "functioning" (being healthy, being educated, participating in community life), while a functioning represents the actual achievement of that state or activity.

Nussbaum (2000, 2011) developed this framework into a more determinate list of "central human capabilities" that she argued every just society should guarantee to all citizens at a

threshold level. Her list of ten central capabilities—including life, bodily health, bodily integrity, senses/imagination/thought, emotions, practical reason, affiliation, other species, play, and control over one's environment—provided a substantive basis for cross-cultural comparison that Sen had deliberately left open. The tension between Sen's procedural openness and Nussbaum's substantive specification has generated a productive literature on how capabilities should be identified and weighted (Robeyns, 2003, 2005; Alkire, 2002; Wolff and De-Shalit, 2007).

For measurement purposes, the central challenge is operationalization: translating philosophical categories into empirically observable indicators. As Alkire (2008) observed, the capability approach specifies the evaluative space but does not determine the specific indicators or aggregation procedure appropriate for any given application. This has led to a diversity of measurement strategies, from the HDI's parsimonious three-dimensional structure to the Multidimensional Poverty Index's focus on deprivation counting (Alkire and Foster, 2011; Alkire and Santos, 2014).

2.2 Existing Composite Indices

The UNDP Human Development Index, introduced in the 1990 *Human Development Report* following the foundational work of Mahbub ul Haq and Amartya Sen (Anand and Sen, 1994), measures three dimensions: health (life expectancy at birth), education (mean and expected years of schooling), and standard of living (GNI per capita, PPP). The HDI's simplicity has been both its strength—enabling broad adoption and easy communication—and its limitation. Srinivasan (1994) criticized its arbitrary weighting, Ravallion (2012) questioned whether it adds information beyond its components, and Ranis, Stewart, and Samman (2006) argued that it omits critical dimensions of human development including political participation, security, and environmental sustainability.

The Multidimensional Poverty Index (MPI), developed by Alkire and Foster (2011) and adopted by UNDP in 2010, addresses some of these limitations by measuring acute deprivation across ten indicators in three dimensions (health, education, and living standards). The MPI's "dual cutoff" methodology—identifying who is deprived in each indicator and then determining who is multidimensionally poor—represents a significant methodological advance. However, the MPI is focused on deprivation rather than capability attainment, and its temporal coverage is limited to the post-2000 period for most countries (Alkire and Santos, 2014).

The Social Progress Index (SPI), developed by Stern, Wares, and Epner (2017), takes a broader approach, measuring social progress across three dimensions—basic human needs, foundations of well-being, and opportunity—using 50 indicators. The SPI explicitly excludes economic indicators, seeking to measure social progress independently of GDP. While this

design choice has analytical value, it means the SPI cannot capture the material dimensions of capability that Sen (1999) identified as instrumentally important for freedom.

The Inequality-adjusted Human Development Index (IHDI) modifies the standard HDI by discounting each dimension's average value according to its level of inequality (Atkinson, 1970; Foster, Lopez-Calva, and Szekely, 2005). The IHDI thus penalizes countries where achievements are unequally distributed, a theoretically important correction given Sen's (1992) emphasis on the distribution of capabilities. However, like the HDI, the IHDI is limited to three dimensions and has temporal coverage beginning only in 2010 (UNDP, 2023).

2.3 Modernization Theory and the Capability-Freedom Nexus

The relationship between human development and political freedom has been a central concern of comparative politics since Lipset's (1959) "Some Social Requisites of Democracy," which documented a positive correlation between economic development and democratic governance. Lipset's thesis was elaborated by Rostow (1960), who proposed a "stages of growth" model in which economic modernization would produce a middle class that would demand political liberalization. Inglehart (1997) updated this framework with survey data showing that economic security produces "post-materialist" values that support democratic governance.

The strongest version of the thesis appeared in Fukuyama's (1992) *The End of History*, which predicted that liberal democracy would become the universal endpoint of political development as societies modernized. However, this prediction has been challenged by the empirical record. Acemoglu and Robinson (2006) showed that the relationship between income and democracy is not robust when controlling for fixed effects. Przeworski and Limongi (1997) demonstrated that while democracies rarely collapse at high income levels, the transition to democracy is not predicted by income alone. Most recently, the "democratic recession" documented by Diamond (2015) and the rise of competitive authoritarianism (Levitsky and Way, 2010) have challenged the inevitability of democratic convergence.

The present paper contributes to this debate by shifting the measurement from income (GDP per capita) to a comprehensive capability index. If modernization theory operates through the capability mechanism—that is, if it is the expansion of health, education, and material security that creates pressure for political opening, rather than income per se—then a capability-based index should be more informative than income alone for testing the theory's predictions. Our finding that the capability-liberty correlation has declined even as the absolute level of capabilities has risen globally suggests that the modernization mechanism has weakened or been offset by countervailing forces.

3. Theoretical Framework

3.1 From Capabilities to Domains

The HCI is organized around seven domains, each representing a cluster of related capabilities drawn from the Sen-Nussbaum framework. The mapping from Nussbaum's (2011) list of central capabilities to our seven domains is not one-to-one; rather, it reflects the practical constraints of cross-national measurement and the availability of comparable indicators over extended time periods. Table 1 presents the mapping between Nussbaum's central capabilities and the HCI domains.

Table 1: Mapping from Nussbaum's Central Capabilities to HCI Domains

Nussbaum Capability	HCI Domain	Rationale
Life	D1: Survival & Longevity	Being able to live to the end of a human life of normal length
Bodily Health	D2: Maternal & Child Health	Being able to have good health, including reproductive health
Senses, Imagination, Thought	D3: Knowledge & Education	Being able to use the senses, informed by adequate education
Bodily Integrity; Control over Environment (material)	D4: Material Living Standard	Being able to hold property and seek employment on an equal basis
Emotions; Practical Reason	D5: Psychological Well-being	Being able to have emotional attachments; to form a conception of the good
Bodily Health (environment)	D6: Basic Infrastructure	Being able to live in adequate environmental conditions
Affiliation; Control over Environment (political)	D7: Agency & Equality	Being able to participate effectively in political choices; non-discrimination

Note: The mapping is indicative, not exhaustive. Several of Nussbaum's capabilities (e.g., Play, Other Species) lack cross-nationally comparable indicators over extended time periods and are not represented in the current index.

3.2 Domain Definitions

Domain 1: Survival and Longevity. This domain captures the most fundamental capability: being alive and having the prospect of a life of reasonable length. Following Sen's (1998) analysis of mortality as capability deprivation, we include life expectancy at birth and infant mortality rate. These indicators have the deepest historical coverage in the dataset, with reliable estimates extending to 1800 for major powers (Riley, 2005; Gapminder Foundation, 2023).

Domain 2: Maternal and Child Health. Maternal mortality ratio and under-5 stunting prevalence capture the capability to reproduce safely and to nourish children through early development. Nussbaum (2000) identified reproductive health as central to bodily health, and the maternal mortality ratio is widely regarded as among the most sensitive indicators of health system functionality (WHO, 2023). This domain has shorter temporal coverage (1990–2023 for maternal mortality, 2000–2022 for stunting), reflecting the later development of systematic measurement systems.

Domain 3: Knowledge and Education. Adult literacy rate, mean years of schooling, and expected years of schooling capture the capability to use one's mind in ways "informed and cultivated by an adequate education" (Nussbaum, 2011, p. 33). Literacy has the deepest historical coverage (estimates to 1800 via van Zanden et al., 2014, and Our World in Data), while schooling metrics rely on the Barro-Lee (2013) dataset and UNESCO Institute for Statistics.

Domain 4: Material Living Standard. GDP per capita (PPP, 2017 international dollars) and extreme poverty rate capture the material basis of capability. Sen (1999) was careful to distinguish income as instrumentally rather than intrinsically valuable, and our inclusion of poverty rate alongside GDP per capita ensures that the domain captures both average affluence and the distribution's lower tail. Historical GDP estimates rely on the Maddison Project Database (Bolt and van Zanden, 2020).

Domain 5: Psychological Well-being. Life satisfaction (Gallup World Poll / World Happiness Report) and suicide mortality rate (WHO) capture the subjective and behavioral dimensions of well-being that Nussbaum (2011) associated with emotions and practical reason. This is the most temporally constrained domain, with life satisfaction data available only from 2005 and suicide rates from approximately 1950 for most countries.

Domain 6: Basic Infrastructure. Access to safe water and access to electricity capture the environmental preconditions for capability realization. Without potable water and reliable energy, many other capabilities are effectively foreclosed. Data derive from the WHO/UNICEF Joint Monitoring Programme and the World Bank/IEA, with coverage from 1990 and 2000 respectively.

Domain 7: Agency and Equality. The Gender Development Index (UNDP) and voter turnout (IDEA) capture the capabilities of political participation and non-discrimination that Nussbaum (2011) associated with "affiliation" and "control over one's environment." This domain is analytically distinct from the Political Topology liberty score, which measures institutional and legal freedoms; the HCI agency indicators measure realized participation and equality of opportunity.

3.3 The Dual-Axis Framework

The HCI is designed to be plotted against the Political Topology liberty score, creating a two-dimensional space in which capability (y-axis) and freedom (x-axis) are independently measured. This dual-axis framework enables the identification of four quadrants defined by threshold values of HCI = 70 and Liberty = 60:

Quadrant I (Northeast): Free and Capable. HCI ≥ 70, Liberty ≥ 60. Countries that deliver both high capabilities and political freedom. The traditional developed democracies.

Quadrant II (Northwest): Capable Autocracy. HCI ≥ 70, Liberty < 60. Countries that deliver capabilities without freedom. The central puzzle for modernization theory.

Quadrant III (Southwest): Neither. HCI < 70, Liberty < 60. Countries with low capabilities and low freedom. Failed and fragile states.

Quadrant IV (Southeast): Free but Struggling. HCI < 70, Liberty ≥ 60. Countries with political freedom but limited capability attainment. Emerging democracies with developmental challenges.

The threshold values are not arbitrary. The HCI threshold of 70 corresponds approximately to the 50th percentile of the 2023 global distribution and aligns with the minimum score at which all four "deep historical" indicators (life expectancy, infant mortality, adult literacy, GDP per capita) consistently register above their respective medians. The Liberty threshold of 60 corresponds to Freedom House's boundary between "Partly Free" and "Free" categories when rescaled to the Political Topology 0–100 metric.

4. Index Construction Methodology

4.1 Indicator Selection Criteria

Indicators were selected according to five criteria: (1) theoretical grounding in the Sen-Nussbaum capability framework; (2) cross-national comparability, with data available for a substantial majority of the 91 countries in the Political Topology database; (3) temporal depth, with a preference for indicators with coverage extending before 1950; (4) source reliability, with reliance on established international statistical organizations (UN, WHO, World Bank, UNESCO); and (5) minimal redundancy, ensuring that each indicator contributes information not already captured by other indicators in the same domain.

Table 2 presents the complete list of 15 indicators organized by domain, including unit of measurement, temporal coverage, primary source, and current data population status.

Table 2: The 15 HCI Indicators

#	Indicator	Domain	Unit	Coverage	Source	Status
1	Life Expectancy at Birth	D1	Years	1800–2023	Gapminder / UN WPP	Complete
2	Infant Mortality Rate	D1	Per 1,000 live births	1800–2023	Gapminder / UN IGME	Complete
3	Maternal Mortality Ratio	D2	Per 100,000 live births	1990–2023	WHO/UNICEF/UNFPA	Pending
4	Under-5 Stunting Prevalence	D2	% children	2000–2022	WHO/UNICEF/WB JME	Pending
5	Adult Literacy Rate	D3	% age 15+	1800–2023	UNESCO / OWID	Complete
6	Mean Years of Schooling	D3	Years (age 25+)	1950–2023	Barro-Lee / UNDP	Pending
7	Expected Years of Schooling	D3	Years	1970–2023	UNESCO UIS	Pending
8	GDP per Capita (PPP)	D4	2017 int'l $	1800–2023	Maddison / World Bank	Complete
9	Extreme Poverty Rate	D4	% below $2.15/day	1981–2022	World Bank PIP	Pending
10	Life Satisfaction	D5	0–10 Cantril scale	2005–2023	Gallup / WHR	Pending
11	Suicide Mortality Rate	D5	Per 100,000	1950–2023	WHO GHO	Pending
12	Safe Water Access	D6	% population	2000–2022	WHO/UNICEF JMP	Pending
13	Electricity Access	D6	% population	1990–2022	World Bank / IEA	Pending
14	Gender Development Index	D7	Ratio (female/male HDI)	1990–2023	UNDP HDR	Pending
15	Voter Turnout	D7	% eligible population	1945–2023	IDEA	Pending

Note: "Complete" indicates the indicator has been fully populated across all 91 countries and all available benchmark years. "Pending" indicates the indicator has been specified and sourced but data entry is in progress. The four complete indicators constitute the "deep historical" core of the index.

4.2 Normalization

Raw indicator values are normalized to a 0–100 scale using min-max normalization. For indicator i with raw value x, observed minimum $x_{\min}$, and observed maximum $x_{\max}$ across all countries and time periods:

$$x_{norm} = (x - x_{min}) / (x_{max} - x_{min}) \times 100 \quad (1)$$

For indicators where higher raw values indicate worse outcomes (infant mortality, maternal mortality, stunting prevalence, extreme poverty rate, and suicide mortality rate), the normalization is inverted:

$$x_{norm} = (x_{max} - x) / (x_{max} - x_{min}) \times 100 \quad (2)$$

We use observed rather than theoretical goalposts for normalization, departing from the HDI's practice of setting fixed minimum and maximum values (e.g., life expectancy bounded at 20 and 85 years). The observed-range approach has the advantage of utilizing the full 0–100 scale, improving discrimination among countries at the extremes, but the disadvantage that normalization parameters may shift as new data are added. For the current dataset, normalization parameters are computed once across all countries and all benchmark years (1800–2023), creating a fixed mapping that enables valid cross-temporal comparison.

4.3 Aggregation

The composite HCI score is computed as the unweighted arithmetic mean of all available normalized indicator values for a given country-year observation:

$$HCI_{c,t} = (1/n_{c,t}) \sum_{i=1}^{n_{c,t}} x_{i,norm} \quad (3)$$

where $n_{c,t}$ is the number of indicators with non-missing values for country c at time t. A minimum threshold of 3 available indicators is required for a composite score to be computed; country-year observations with fewer than 3 available indicators receive no composite score.

The choice of equal weighting follows the practice of the HDI and reflects the Sen-Nussbaum principle that capabilities are non-substitutable: a deficiency in one dimension cannot be compensated by an excess in another. Equal weighting is the default assumption when no empirical or normative basis exists for differential weighting (Decancq and Lugo, 2013). As we demonstrate in Section 8, the results are robust to alternative weighting schemes, including domain-level equal weighting and geometric mean aggregation.

4.4 Temporal Structure

The index is constructed at 13 benchmark years: 1800, 1850, 1900, 1913, 1929, 1945, 1960, 1975, 1990, 2000, 2010, 2020, and 2023. These benchmark years were selected to correspond to major geopolitical inflection points (World Wars, decolonization, Cold War, post-Cold War) and to align with the temporal coverage of the underlying data sources. The unequal spacing of benchmark years reflects the increasing density of available data over time: pre-1900 benchmarks are spaced 50 years apart, while post-1990 benchmarks are spaced approximately 10 years apart.

Data availability varies substantially across eras. Table 3 summarizes coverage by historical period.

Table 3: Data Coverage by Historical Period

Period	Indicator Coverage	Country Coverage	Quality Assessment
1800–1850	3 indicators (Life Exp., Literacy, GDP)	~20% of 91 countries	Sparse: select European powers
1850–1900	4 indicators (+IMR)	~35%	Expanding: colonial records
1900–1950	6 indicators (+Schooling, Suicide)	~50%	Fair: major powers plus colonies
1950–1990	10 indicators (+MMR, Poverty, Voting, Electricity)	~75%	Good: Cold War-era statistical infrastructure
1990–2023	All 15 indicators	~92%	Excellent: modern measurement systems

5. Data Sources and Coverage

5.1 Primary Data Sources

The HCI draws on 16 primary data sources, each selected for its authority, cross-national coverage, and scholarly acceptance. Table 4 lists the primary sources by indicator.

Table 4: Primary Data Sources

Source	Indicators Covered	Temporal Range
Gapminder Foundation v14	Life expectancy, infant mortality	1800–2023
UN World Population Prospects 2022	Life expectancy, infant mortality (post-1950)	1950–2023
UN IGME (Inter-Agency Group for Child Mortality Estimation)	Infant mortality, under-5 mortality	1990–2023
WHO/UNICEF/UNFPA	Maternal mortality ratio	1990–2023
WHO/UNICEF/WB Joint Malnutrition Estimates	Under-5 stunting	2000–2022
UNESCO Institute for Statistics / Our World in Data	Adult literacy, expected years of schooling	1800–2023
Barro-Lee Educational Attainment Dataset	Mean years of schooling	1950–2023
Maddison Project Database 2020	GDP per capita (historical)	1800–2018
World Bank World Development Indicators	GDP per capita, poverty, electricity, water	1960–2023
World Bank Poverty and Inequality Platform	Extreme poverty rate	1981–2022
Gallup World Poll / World Happiness Report	Life satisfaction (Cantril ladder)	2005–2023
WHO Global Health Observatory	Suicide mortality rate	1950–2023
WHO/UNICEF Joint Monitoring Programme	Safe water access	2000–2022
UNDP Human Development Report	Gender Development Index	1990–2023
International IDEA Voter Turnout Database	Voter turnout	1945–2023
Riley (2005); Bourguignon & Morrisson (2002); van Zanden et al. (2014)	Historical life expectancy, inequality, literacy	1800–1950

5.2 Coverage Statistics

The full HCI matrix comprises 91 countries × 13 benchmark years × 15 indicators = 17,745 theoretical cells. Of these, 8,104 cells are currently populated (45.7% of the theoretical maximum). The four "complete" indicators (life expectancy, infant mortality, adult literacy, and GDP per capita) account for 3,479 populated observations, or 74.6% coverage of their 91 × 13 = 1,183 potential cells each. The remaining 11 indicators have varying levels of population, ranging from 18.4% (under-5 stunting) to 51.9% (mean years of schooling).

The country universe of 91 matches exactly the Political Topology database, enabling one-to-one matching between capability and liberty scores. Countries were included if they met two criteria: (1) sovereign or effectively autonomous political entity with a population

exceeding one million in 2023, and (2) sufficient data availability to compute an HCI score for at least the 2023 benchmark year. The resulting sample covers approximately 97% of the world's population.

6. The "No Fabrication" Protocol

A distinctive feature of the HCI is its data integrity protocol, which can be summarized as: *no interpolation, no fabrication; missing equals missing*. This protocol reflects a deliberate methodological choice that departs from the practices of most comparable indices and has implications for both the reliability and the coverage of the index.

6.1 The Problem with Imputation in Development Indices

Composite indices routinely employ imputation techniques to fill missing values. The HDI uses regression-based imputation when country data are unavailable (UNDP, 2023). The MPI uses nearest-neighbor imputation within survey rounds (Alkire and Santos, 2014). The SPI uses multiple imputation by chained equations (MICE) for up to 30% of missing values in some indicators (Stern et al., 2017). While these techniques have well-established statistical properties under the assumption that data are Missing at Random (MAR), this assumption is frequently violated in cross-national development data.

The most important violations occur precisely where the data are most needed: in conflict-affected states, authoritarian regimes with incentives to suppress unfavorable statistics, and historical periods where state capacity for data collection was limited. Syria's health statistics post-2011, North Korea's economic data, and pre-colonial African mortality estimates are not missing at random; they are missing because the conditions that produce the worst outcomes are the same conditions that prevent measurement. Imputing values for these cases using patterns derived from better-measured countries systematically biases the index toward underestimating deprivation.

6.2 Protocol Implementation

The HCI's no-fabrication protocol operates as follows:

(1) **No interpolation.** If life expectancy is available for country c in 1960 and 1990 but not 1975, the 1975 value is recorded as missing. No temporal interpolation is performed.

(2) **No cross-country imputation.** If GDP per capita is available for Nigeria but not for neighboring Niger in a given benchmark year, Niger's value is not estimated from Nigeria's or from a regional regression.

(3) **No fabrication.** Where no credible scholarly estimate exists, the cell is left blank. A blank cell is treated as informative: it reflects the historical reality that the data were not collected,

which itself carries information about state capacity, colonial extraction patterns, and political priorities.

(4) **Scholarly estimates accepted with disclosure.** Pre-1950 values derived from scholarly estimation (e.g., Maddison's GDP reconstructions, Riley's life expectancy estimates) are included but flagged with wider confidence intervals. These estimates are the product of decades of careful historical reconstruction by specialists and represent the best available knowledge, but they carry greater uncertainty than modern administrative data.

(5) **Composite scores require minimum 3 indicators.** A country-year HCI score is computed only if at least 3 of the 15 indicators have non-missing values. This prevents meaningless composites based on a single indicator while allowing historical coverage where only the deep-history indicators are available.

6.3 Consequences of the Protocol

The no-fabrication protocol has three primary consequences. First, it reduces coverage: 9,641 of the 17,745 theoretical cells (54.3%) are left blank. This is substantially more missing data than users of the HDI or MPI are accustomed to encountering. Second, it creates variable indicator counts across country-year observations, which means that the composite score is not strictly comparable across observations with different numbers of contributing indicators. We mitigate this by reporting the indicator count alongside each composite score and by testing sensitivity to minimum-indicator thresholds (Section 8). Third, it increases the transparency of the index: users can inspect the data matrix and immediately see where evidence exists and where it does not, without needing to distinguish measured values from imputed values.

We regard the third consequence as a virtue. The gap *is* the data. A world map of HCI coverage, with its voids over pre-colonial Africa, wartime Europe, and contemporary conflict zones, communicates something important about the global distribution of knowledge and state capacity. Filling those voids with imputed values would obscure this information.

7. Validation Against Existing Indices

7.1 Convergent Validity: HDI

We validate the HCI against the UNDP Human Development Index for the 2023 benchmark year, which provides the most complete overlap between the two indices. Computing the Pearson correlation between HCI composite scores and HDI values for all 91 countries yields $r = 0.92$ ($p < 0.001$, $n = 89$).

> **Validation Result:** The correlation between HCI and HDI ($r = 0.92$) confirms strong convergent validity. The two indices measure overlapping constructs, as expected given that three of the HDI's four components (life expectancy, mean years of schooling, expected years of schooling) are also included in the HCI. The less-than-perfect correlation reflects the HCI's additional dimensions: maternal health, psychological well-being, infrastructure, and agency.

The Spearman rank correlation is $r_s = 0.94$, indicating that the ordinal ranking of countries is even more closely preserved than the cardinal scores. This is expected because rank correlations are less sensitive to the different functional forms of the two indices' normalization procedures.

Analysis of residuals (HCI minus HDI ranking) reveals systematic patterns. Countries that rank substantially higher on the HCI than on the HDI tend to have strong infrastructure and low suicide rates (e.g., Singapore, UAE, Saudi Arabia). Countries that rank higher on the HDI than on the HCI tend to have high incomes but poor performance on agency and equality indicators (e.g., Qatar, Bahrain). These patterns confirm that the HCI captures dimensions of capability that the HDI omits.

7.2 Discriminant Validity: Liberty Score

The correlation between HCI and the Political Topology liberty score is $r = 0.57$ for the 2023 cross-section. This moderate positive correlation confirms that capability and freedom are related but distinct constructs—the theoretical expectation from both the capability approach and the broader political science literature. A very high correlation would suggest the two indices are measuring the same thing; a zero correlation would suggest no relationship at all. The observed $r = 0.57$ indicates a meaningful but far-from-deterministic relationship, creating the analytical space in which the quadrant classification becomes informative.

7.3 Comparison with MPI and SPI

The Multidimensional Poverty Index (MPI) and the HCI are not directly comparable because they measure different constructs (deprivation vs. capability attainment) and operate at different units of analysis (household vs. country). However, a country-level comparison reveals a strong negative correlation ($r = -0.81$) between HCI scores and MPI headcount ratios for the 54 countries with available MPI data, confirming that countries with high capability scores have low multidimensional poverty rates.

The Social Progress Index (SPI) correlates at $r = 0.88$ with the HCI for the 85 countries with available SPI data. The somewhat lower correlation relative to the HDI reflects the SPI's exclusion of economic indicators and its inclusion of environmental quality and personal safety dimensions not captured by the HCI.

8. Quadrant Classification and Results

8.1 The 2023 Cross-Section

Applying the dual thresholds of HCI = 70 and Liberty = 60 to the 2023 cross-section of 91 countries produces the following distribution:

Table 5: Quadrant Distribution (2023)

Quadrant	Count	Description	Representative Countries
Free & Capable	38	HCI ≥ 70, Liberty ≥ 60	Norway (L=98, HCI=92), Denmark, Sweden, Canada, Japan, South Korea, Chile, Uruguay
Capable Autocracy	39	HCI ≥ 70, Liberty < 60	China (L=5, HCI=86), Russia (L=10, HCI=87), Saudi Arabia (L=7, HCI=89), Singapore (L=47, HCI=92)
Neither	8	HCI < 70, Liberty < 60	Afghanistan (L=3, HCI=51), DRC Congo (L=5, HCI=46), Somalia (L=8, HCI=49), Haiti (L=8, HCI=56)
Free but Struggling	6	HCI < 70, Liberty ≥ 60	Botswana (L=71, HCI=70), Ghana (L=65, HCI=72), India (L=62, HCI=72)

The near-parity between Free and Capable states (38) and Capable Autocracies (39) is the central empirical finding. This parity has never previously obtained in the dataset. In 1990, the corresponding figures were approximately 30 Free and Capable states and 15 Capable Autocracies; in 1960, the ratio was approximately 20 to 5. The rise of Capable Autocracies as a modal category reflects both the absolute improvement in capabilities across authoritarian regimes (particularly in East Asia, Central Asia, and the Gulf states) and the relative stagnation or decline of liberty in several middle-income countries.

8.2 Regional Composition of Capable Autocracies

The 39 Capable Autocracies are regionally diverse. Table 6 shows the regional distribution.

Table 6: Regional Distribution of Capable Autocracies

Region	Count	% of Total	Examples
Asia	10	25.6%	China, Vietnam, Cambodia, Thailand, Malaysia, Singapore
MENA	10	25.6%	Saudi Arabia, UAE, Iran, Egypt, Turkey, Jordan, Tunisia
Eurasia	7	17.9%	Russia, Belarus, Kazakhstan, Uzbekistan, Armenia, Georgia, Moldova
Latin America	5	12.8%	Cuba, Venezuela, Nicaragua, Mexico, Guatemala
Europe	3	7.7%	Hungary, Serbia, (borderline cases)
Sub-Saharan Africa	3	7.7%	Rwanda, Zimbabwe, (borderline cases)
North America	1	2.6%	United States (L=48, HCI=91)*

**Note: The United States liberty score of L=48 reflects the Political Topology Index's real-time assessment for 2025. Freedom House's 2024 score was 83/100; V-Dem's liberal democracy score was approximately 65–72 on a rescaled basis. The classification is sensitive to the liberty measure used. See methodology disclosure in Section 11.*

8.3 What Capable Autocracies Deliver—and What They Do Not

Comparing mean values across the Free and Capable and Capable Autocracy quadrants reveals what the "autocrat's bargain" provides and what it withholds:

Table 7: Mean Indicator Values by Quadrant

Indicator	Free & Capable (n=38)	Capable Autocracy (n=39)	Difference
Life Expectancy (years)	80.2	74.8	−5.4
Infant Mortality (per 1,000)	4.1	14.7	+10.6
Adult Literacy (%)	98.7	92.4	−6.3
GDP per Capita (PPP, $)	35,700	17,600	−18,100
Life Satisfaction (0–10)	6.5	5.4	−1.1
Gender Parity (ratio)	0.99	0.90	−0.09
HCI Composite	89.2	82.1	−7.1
Liberty Score	85.4	19.3	−66.1

The pattern is clear. Capable Autocracies deliver health, education, and infrastructure at levels sufficient to qualify as "capable" (HCI above 70), but they lag substantially on GDP per capita, life satisfaction, and gender equality. The gap in life satisfaction (1.1 points on a 10-point scale) is particularly notable because it represents a direct measure of subjective well-being that is not captured by material indicators. Capable Autocracies provide the hardware of human development—hospitals, schools, roads, electricity—while withholding the software: voice, agency, dignity, and the freedom to shape one's own governance.

9. Applications: Testing Modernization Theory

9.1 The Declining Correlation

The core prediction of modernization theory is that rising human capabilities will produce political liberalization. If this prediction is correct, the correlation between HCI and Liberty should be positive and stable (or increasing) over time. We test this by computing the Pearson correlation between matched HCI and Liberty observations for each of four historical eras.

Table 8: HCI-Liberty Correlation by Era

Era	Correlation (r)	N (matched pairs)	Interpretation
Pre-1900	**0.79**	~78	Strong: only free nations mobilized development institutions
1900–1945	**0.74**	~85	Declining: colonial extraction builds infrastructure without freedom
1945–1990	**0.61**	~88	Moderate: Soviet model demonstrates industrial capability under totalitarianism
1990–2023	**0.57**	~91	Weak: China, Gulf states, Asian tigers prove autocratic modernization at scale

The decline from $r = 0.79$ to $r = 0.57$ is both statistically significant (Fisher's z-test, $p < 0.01$) and substantively large, representing a reduction of 28% in the strength of the linear relationship. The decline is not monotonic within sub-periods, but the overall trend is clear and robust to alternative specifications (see Section 9.3).

9.2 Country Trajectories

The era-level correlations conceal important heterogeneity in country-level trajectories. We identify four archetypal trajectory patterns in the Liberty-Capability space:

The Diagonal Path (South Korea). From Japanese colony (L=5, HCI=14 in 1900) through authoritarian industrialization under Park Chung-hee to democratic transition in 1987, South Korea traced a trajectory that modernization theory predicts: capability accumulation eventually producing political opening. By 2023, South Korea sits at L=83, HCI=86. However, the democratic transition was not automatic; it required mass social mobilization and favorable geopolitical conditions (Haggard and Kaufman, 2016).

The Vertical Path (China). China's trajectory is nearly vertical in Liberty-Capability space. HCI rose from approximately 19 (1850) to 86 (2023)—a gain of 67 points—while Liberty moved from 3 to 5, a gain of 2 points. No other country has achieved this scale of human development

with so little political change. China represents the strongest single-country disconfirmation of modernization theory in the dataset.

The Leftward Collapse (Venezuela). Venezuela demonstrates that the decoupling of capability and freedom can also operate in reverse. Liberty collapsed from 72 (1975) to 8 (2023), a decline of 64 points, while HCI initially held steady around 70–79 and then began to decline with a lag of approximately 5–10 years. This trajectory suggests that the loss of freedom eventually degrades capability, but with a temporal lag that may be long enough to sustain the autocrat's bargain for a generation.

The Inverted-J (United States). For 220 years, the United States traced a textbook modernization trajectory, rising from L=42, HCI=42 (1800) to L=94, HCI=88 (2010). Between 2010 and 2025, the US experienced a rapid horizontal movement leftward: Liberty fell from 94 to 48 (by the Political Topology metric) while HCI continued rising to 91. The American trajectory now resembles an inverted "J"—centuries of concurrent progress in capability and freedom followed by a sudden decoupling of the two.

9.3 Robustness of the Correlation Decline

We conduct three robustness tests on the declining correlation finding.

Test 1: Geometric Mean Aggregation

Recomputing the HCI using geometric mean aggregation (with a +1 shift to handle zero values) rather than arithmetic mean produces a Spearman rank correlation of $r_s > 0.95$ with the original HCI rankings. The era-by-era correlation decline is preserved: the geometric-mean HCI also shows a declining correlation with Liberty across the four eras.

Test 2: Leave-One-Domain-Out Jackknife

Recomputing the HCI seven times, each time dropping one domain, and recalculating the Liberty-HCI correlation yields a range of r values from 0.53 to 0.62 for the post-1990 era. No single domain removal changes the correlation by more than 0.05 or the count of Capable Autocracies by more than 3. The finding is not driven by any single domain.

Test 3: Bootstrap Resampling

Drawing 10,000 bootstrap samples of $n = 78$ (the pre-1900 sample size) from the post-2006 data and computing the correlation distribution yields a 95th percentile of approximately 0.68—well below the observed pre-1900 correlation of 0.79. The probability of observing $r = 0.79$ by chance from the modern distribution is less than 5%, confirming that the pre-1900 correlation is significantly higher than what would be expected from modern data. The high early correlation is not a small-sample artifact.

Test 4: Constant Panel

Restricting the analysis to countries present in all four eras (the "constant panel") and recomputing era-by-era correlations produces a similar pattern of decline. This confirms that the decorrelation is not driven by the changing sample composition—the addition of post-colonial states to the dataset—but reflects a genuine change in the relationship between capability and freedom within a fixed set of countries.

> **Finding:** The decline in the HCI-Liberty correlation from $r = 0.79$ (pre-1900) to $r = 0.57$ (post-1990) is robust to alternative aggregation methods, domain composition, sample size effects, and panel composition. The finding is rated as "Supported" by the independent thesis audit.

10. Current Status and Data Gaps

10.1 Completion Progress

As of February 2026, the HCI is at 27% completion as measured by the number of fully populated indicators: 4 of 15 indicators are complete. The four complete indicators are the "deep historical" core: life expectancy at birth (Indicator 1), infant mortality rate (Indicator 2), adult literacy rate (Indicator 5), and GDP per capita PPP (Indicator 8). These four indicators have temporal coverage extending to 1800 and account for 3,479 populated observations across 91 countries and 13 benchmark years.

By a cell-count measure, the completion is higher: 8,104 of 17,745 theoretical cells (45.7%) are populated, because several "pending" indicators have partial data entry. Table 9 shows the data population status by indicator.

Table 9: Data Population by Indicator

#	Indicator	Cells Filled	% Coverage
1	Life Expectancy at Birth	883	74.6%
2	Infant Mortality Rate	865	73.1%
3	Maternal Mortality Ratio	455	38.5%
4	Under-5 Stunting	218	18.4%
5	Adult Literacy Rate	881	74.5%
6	Mean Years of Schooling	614	51.9%
7	Expected Years of Schooling	532	45.0%
8	GDP per Capita (PPP)	850	71.9%
9	Extreme Poverty Rate	405	34.2%
10	Life Satisfaction	264	22.3%
11	Suicide Mortality Rate	474	40.1%
12	Safe Water Access	364	30.8%
13	Electricity Access	455	38.5%
14	Gender Development Index	418	35.3%
15	Voter Turnout	426	36.0%
Total		**8,104**	**45.7%**

10.2 Structural Data Gaps

Several data gaps are structural rather than merely operational. Life satisfaction data (Indicator 10) are available only from 2005 due to the recency of the Gallup World Poll, creating a permanent gap for all pre-2005 benchmark years. Stunting data (Indicator 4) begin only in 2000 for most countries. Voter turnout (Indicator 15) is inherently undefined for periods of authoritarian rule, creating a conceptual rather than measurement gap. These structural limitations mean that the full 15-indicator index can never achieve coverage comparable to the 4-indicator core for pre-1990 periods.

10.3 Pipeline for Completion

The remaining 11 indicators are prioritized for population in two phases. Phase 2 targets indicators with existing digital databases requiring only standardization and country-matching: mean years of schooling (Barro-Lee), expected years of schooling (UNESCO UIS), maternal mortality (WHO), extreme poverty (World Bank PIP), and electricity access (IEA). Phase 3 targets indicators requiring more extensive data reconciliation: stunting

(WHO/UNICEF JME), safe water (JMP), life satisfaction (Gallup), suicide rate (WHO GHO), Gender Development Index (UNDP), and voter turnout (IDEA).

11. Limitations

The HCI has several limitations that should be acknowledged.

Incomplete indicator coverage. With only 4 of 15 indicators fully populated, the current composite scores are dominated by the deep-historical indicators. The composite score for pre-1990 observations is based almost entirely on life expectancy, infant mortality, literacy, and GDP—a narrower base than the intended 15-indicator framework. As additional indicators are populated, composite scores may shift, particularly for countries with divergent performance across domains (e.g., high GDP but low gender equality).

Equal weighting assumption. The use of equal weights across indicators implies that a one-unit improvement in normalized life expectancy is equivalent to a one-unit improvement in normalized voter turnout. This assumption is difficult to justify theoretically and has been criticized in the composite index literature (Decancq and Lugo, 2013; Ravallion, 2012). Our sensitivity analysis shows that rankings are robust to reasonable alternative weighting schemes, but the level of the composite score is sensitive to weighting choices.

Min-max normalization sensitivity. The use of observed rather than theoretical goalposts means that normalization parameters are sensitive to outliers and will shift as the dataset expands. A country's normalized score may change not because its raw performance changed but because the normalization bounds shifted. This is a common limitation of min-max normalized indices (OECD, 2008).

Temporal non-comparability. The varying number of available indicators across time periods means that the composite score is not strictly comparable between, say, 1850 (3 indicators) and 2023 (up to 15 indicators). We mitigate this by reporting the indicator count and by testing sensitivity to minimum-indicator thresholds, but users should exercise caution in interpreting temporal trends in the composite score.

Liberty score sensitivity. The quadrant classification depends on the liberty measure used. The Political Topology Index, Freedom House, and V-Dem produce different liberty estimates for the same countries, and the choice of measure can shift individual countries between quadrants. The classification of the United States as a Capable Autocracy under the PTI metric (L=48) would not obtain under Freedom House (83/100) or most V-Dem specifications. We report the PTI classification as our primary specification but acknowledge that this is the most controversial classification in the dataset.

Pre-1900 sample bias. The pre-1900 sample is dominated by European powers and their colonies, which introduces survivor bias. The countries present in the pre-1900 data are

disproportionately those that developed the statistical infrastructure to measure themselves—precisely the countries where capability and freedom were most closely linked. The high pre-1900 correlation (r = 0.79) may be partly an artifact of this selection effect, although our bootstrap analysis (Section 9.3) suggests it cannot be fully explained by sample size alone.

Causal claims. The HCI documents correlations, not causal relationships. The declining correlation between capability and liberty does not establish whether capabilities cause (or fail to cause) political liberalization, or whether third factors (oil wealth, geopolitical competition, digital surveillance technology) confound the relationship. Causal identification would require instrumental variable strategies or natural experiments that are beyond the scope of this descriptive paper.

12. Conclusion and Future Work

This paper has introduced the Human Capabilities Index, a 15-indicator composite measure grounded in the Sen-Nussbaum capability approach, covering 91 countries over 225 years. The index addresses a gap in the development measurement literature by providing a comprehensive, capability-theoretic measure that extends beyond the HDI's three dimensions while maintaining the transparency and replicability that a "no fabrication" data protocol ensures.

Our central empirical contribution is the documentation of a secular decline in the correlation between human capabilities and political liberty, from r = 0.79 in the pre-1900 era to r = 0.57 in the post-1990 era. This decline is robust to alternative aggregation methods, domain composition, and sample selection. The quadrant classification reveals that Capable Autocracies—states delivering HCI scores above 70 while maintaining liberty scores below 60—now equal the number of Free and Capable democracies for the first time in the dataset's 225-year span. These findings constitute a direct empirical challenge to the core prediction of modernization theory.

We emphasize that these findings challenge the *automaticity* of the modernization mechanism, not its existence. South Korea demonstrates that capability accumulation can contribute to democratic transition, but only when institutional conditions permit. China demonstrates that capabilities can be delivered indefinitely without political opening. The HCI framework enables researchers to distinguish these trajectories empirically rather than assuming that one path is universal.

Future work will proceed along four tracks. First, completing the population of the remaining 11 indicators will strengthen the composite score and enable domain-level analysis that is currently limited by sparse data. Second, we will develop inequality-adjusted versions of the HCI following the IHDI methodology, since within-country inequality in capability attainment is theoretically and empirically important. Third, we will construct uncertainty

estimates (confidence intervals) for historical observations, reflecting the greater uncertainty of pre-1950 scholarly estimates relative to modern administrative data. Fourth, we will use the completed HCI in formal econometric tests of modernization theory, employing panel data methods and instrumental variable strategies to move beyond the correlational analysis presented here.

The emergence of Capable Autocracies as a modal category in world politics has implications beyond academic measurement. If the modernization mechanism has indeed weakened—if capability no longer reliably produces freedom—then the 4.5 billion people living under capable autocracies cannot rely on economic development alone to deliver political liberalization. The case for democracy must be made on its own terms: not as a byproduct of growth, but as a value worth defending in its own right.

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Appendix A: Full Indicator List with Sources and Normalization

Table A1: Indicator Specification

#	Indicator	Unit	Direction	Primary Source	Observed Min	Observed Max
1	Life Expectancy at Birth	Years	Higher = better	Gapminder / UN WPP	23.0	85.4
2	Infant Mortality Rate	Per 1,000	Lower = better (inverted)	Gapminder / UN IGME	1.6	421.0
3	Maternal Mortality Ratio	Per 100,000	Lower = better (inverted)	WHO/UNICEF/UNFPA	2.0	1,150.0
4	Under-5 Stunting	% children	Lower = better (inverted)	WHO/UNICEF/WB JME	1.3	57.5
5	Adult Literacy Rate	% age 15+	Higher = better	UNESCO / OWID	0.5	99.9
6	Mean Years of Schooling	Years (25+)	Higher = better	Barro-Lee / UNDP	0.2	14.1
7	Expected Years of Schooling	Years	Higher = better	UNESCO UIS	1.0	21.3
8	GDP per Capita (PPP)	2017 int'l $	Higher = better	Maddison / World Bank	350	118,000
9	Extreme Poverty Rate	% <$2.15/day	Lower = better (inverted)	World Bank PIP	0.0	77.6
10	Life Satisfaction	0–10 Cantril	Higher = better	Gallup / WHR	2.4	7.8
11	Suicide Mortality Rate	Per 100,000	Lower = better (inverted)	WHO GHO	1.0	44.2
12	Safe Water Access	% population	Higher = better	WHO/UNICEF JMP	22.0	100.0
13	Electricity Access	% population	Higher = better	World Bank / IEA	1.0	100.0
14	Gender Development Index	Ratio	Higher = better	UNDP HDR	0.60	1.04
15	Voter Turnout	% eligible	Higher = better	IDEA	5.0	95.0

Note: Observed minima and maxima are computed across all 91 countries and all benchmark years (1800–2023) and used as normalization bounds. Indicators marked "inverted" use Equation (2) so that a higher normalized score always indicates better capability attainment.

Appendix B: Domain Weighting Methodology

B.1 Baseline: Equal Indicator Weighting

The baseline HCI uses equal weighting across all available indicators for a given country-year observation. Under this scheme, each indicator receives weight $1/n$ where n is the number of non-missing indicators. This is equivalent to the simple arithmetic mean of normalized indicator values.

B.2 Alternative 1: Equal Domain Weighting

An alternative approach assigns equal weight to each of the seven domains, with indicators within a domain sharing that domain's weight equally. Under this scheme, each domain receives weight 1/7 regardless of the number of indicators it contains. For Domain 3 (Knowledge and Education), which has 3 indicators, each indicator receives weight (1/7)/3 = 1/21. For Domain 1 (Survival and Longevity), which has 2 indicators, each indicator receives weight (1/7)/2 = 1/14.

$$HCI_{domain} = (1/7) \sum_{d=1}^{7} (1/n_d) \sum_{i \in d} x_{i,norm} \tag{B1}$$

The Spearman rank correlation between baseline and equal-domain-weighted HCI is $r_s = 0.97$, indicating that the choice between indicator-level and domain-level equal weighting has minimal impact on country rankings.

B.3 Alternative 2: Geometric Mean Aggregation

Following the HDI's post-2010 methodology, we also compute the HCI using the geometric mean of normalized indicators (shifted by +1 to handle zero values):

$$HCI_{geo} = [\prod_{i=1}^{n} (x_{i,norm} + 1)]^{1/n} - 1 \tag{B2}$$

The geometric mean penalizes countries with extreme lows in any indicator, reflecting the non-substitutability principle. The Spearman rank correlation between arithmetic and geometric HCI is $r_s > 0.95$. The largest divergences occur for countries with highly uneven capability profiles (e.g., high GDP per capita but poor gender equality).

B.4 Sensitivity Summary

Across all three weighting schemes, the key findings of the paper are preserved: (1) the correlation decline across eras, (2) the count of Capable Autocracies within ±3 of the baseline

count of 39, and (3) the validation correlation with HDI within ±0.03 of 0.92. The HCI's substantive conclusions are robust to reasonable alternative weighting choices.

Appendix C: Selected Country Scores (2023)

Table C1: HCI and Liberty Scores for Selected Countries (2023)

Country	Region	Liberty	HCI	Gap (HCI–L)	Quadrant
Norway	Europe	98	91.8	−6.2	Free & Capable
New Zealand	Oceania	96	92.3	−3.7	Free & Capable
Denmark	Europe	95	91.5	−3.5	Free & Capable
Switzerland	Europe	96	91.8	−4.2	Free & Capable
Canada	North America	92	89.6	−2.4	Free & Capable
Germany	Europe	90	90.9	+0.9	Free & Capable
Japan	Asia	88	88.7	+0.7	Free & Capable
South Korea	Asia	83	86.4	+3.4	Free & Capable
Chile	Latin America	82	87.3	+5.3	Free & Capable
Uruguay	Latin America	90	84.6	−5.4	Free & Capable
Singapore	Asia	47	92.3	+45.3	Capable Autocracy
UAE	MENA	22	91.7	+69.7	Capable Autocracy
Saudi Arabia	MENA	7	88.7	+81.7	Capable Autocracy
Russia	Eurasia	10	87.4	+77.4	Capable Autocracy
Cuba	Latin America	7	87.9	+80.9	Capable Autocracy
China	Asia	5	85.9	+80.9	Capable Autocracy
Belarus	Eurasia	5	86.4	+81.4	Capable Autocracy
Vietnam	Asia	9	84.0	+75.0	Capable Autocracy
Turkey	MENA	18	86.9	+68.9	Capable Autocracy
Venezuela	Latin America	8	78.8	+70.8	Capable Autocracy
India	Asia	62	72.0	+10.0	Free & Capable
Ghana	Sub-Saharan Africa	65	72.3	+7.3	Free & Capable
Botswana	Sub-Saharan Africa	71	69.6	−1.4	Free but Struggling
Afghanistan	Asia	3	51.1	+48.1	Neither
Somalia	Sub-Saharan Africa	8	49.3	+41.3	Neither
DRC Congo	Sub-Saharan Africa	5	46.2	+41.2	Neither
Haiti	Latin America	8	55.8	+47.8	Neither
United States*	North America	48	90.8	+42.8	Capable Autocracy*

**Note: The United States liberty score of L=48 is the Political Topology Index's real-time assessment for 2025. Under Freedom House (83/100 for 2024) and V-Dem classifications, the US would remain in the Free and Capable quadrant. This classification is the most contested in the dataset and is presented with full methodological disclosure.*

Author Note. This paper was prepared as part of the Political Topology project at Cambridge Governance Labs. The HCI data, methodology, and interactive visualizations are available at the project website. The author acknowledges the foundational intellectual contributions of Amartya Sen and Martha Nussbaum, whose capability approach provides the theoretical framework for the index. The Gapminder Foundation, the World Bank, the United Nations Development Programme, and the many statistical agencies whose data underlie the HCI are gratefully acknowledged. All errors and interpretive choices are the author's own.

Data Availability. The HCI dataset (Excel workbook), analysis code (Python), and interactive dashboards (HTML/JavaScript) are available from the author upon request and will be published in full upon completion of the remaining 11 indicators.

Declaration of Interest. The author declares no competing interests.