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The Middle-Income Trap: Evidence from Indian States and Cross-Country Comparisons

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Abstract

This paper investigates the middle-income trap phenomenon using panel data from Indian states (2000-2024) and cross-country evidence from 95 countries over five decades (1970-2020). We employ threshold regression techniques and growth decomposition methods to identify distinct growth dynamics at different income levels. We find evidence that countries and Indian states face systematic growth slowdowns when reaching $8,000-$15,000 GDP per capita (2015 PPP). The trap is characterized by declining returns to capital accumulation, inability to compete in low-cost manufacturing, and insufficient innovation capacity. Among Indian states, only five of twelve middle-income states successfully transitioned to high-income status, while nationally India remains trapped at upper-middle-income levels. Key determinants of escape include education quality, innovation capacity, export sophistication, and institutional quality.

Keywords: - Economic growth, Threshold regression, Growth decomposition, Indian states, Capital accumulation

I. INTRODUCTION

The middle-income trap describes a phenomenon where rapidly growing economies experience persistent growth slowdowns upon reaching middle-income status and fail to converge toward high-income levels despite decades of effort. This concept, popularized by the (World Bank,2007), has generated substantial academic debate and policy concern as it suggests that economic development becomes systematically more difficult at intermediate income levels. The trap appears particularly relevant for large developing countries including India, China, Brazil, and Mexico that achieved rapid growth from low-income status but now struggle to sustain momentum necessary for convergence to advanced economy living standards. Understanding whether the middle-income trap represents a genuine empirical regularity, identifying its causes, and determining strategies for escape constitute critical questions for development economics and policy.

India presents an especially instructive case for examining middle-income trap dynamics for several reasons. First, India crossed into lower-middle-income status in the early 2000s and reached upper-middle-income status around 2015, placing it squarely in the income range where trap dynamics typically emerge. With GDP per capita of approximately $8,500 in 2024 at purchasing power parity, India has achieved substantial progress from extreme poverty but remains far from high-income thresholds around $20,000 per capita. Second, India's federal structure creates substantial income variation across states, with some states like Goa, Kerala, and Tamil Nadu approaching high-income levels while others including Bihar, Uttar Pradesh, and Madhya Pradesh remain at lower-middle-income levels. This within-country heterogeneity provides variation useful for identifying trap dynamics while controlling for national institutions, policies, and cultural factors that confound cross-country comparisons.

Third, India's development trajectory differs from the East Asian model that successfully escaped the middle-income trap, making India's experience particularly relevant for other large developing countries. Unlike South Korea, Taiwan, and Singapore that emphasized manufacturing-led export growth with heavy government intervention and industrial policy, India has experienced services-led growth with information technology and business process outsourcing driving much recent expansion. Manufacturing has stagnated at approximately 15% of GDP for three decades, raising questions about whether India can achieve high-income status without substantial manufacturing development. Fourth, India faces several challenges

typically associated with middle-income trap dynamics including inadequate education quality despite expanding enrollment, limited innovation capacity with research and development spending below 1% of GDP, infrastructure deficits constraining productivity growth, and institutional weaknesses including corruption and regulatory inefficiency.

This research investigates middle-income trap dynamics through integrated analysis of cross-country evidence and Indian state-level data. Our cross-country analysis examines 95 countries observed from 1970 to 2020, identifying systematic growth slowdowns at specific income thresholds and analyzing characteristics distinguishing countries that successfully transitioned to high-income status from those that remain trapped. Our Indian state analysis examines 28 states from 2000 to 2024, documenting heterogeneous growth trajectories and identifying determinants of sustained growth versus stagnation at middle-income levels. By combining cross-country and within-country evidence, we provide comprehensive understanding of trap dynamics while addressing identification challenges that plague either approach alone.

Several research questions guide our investigation. First, is the middle-income trap a statistically identifiable phenomenon characterized by systematic growth slowdowns at specific income thresholds, or does it represent simply the natural process of convergence as poor countries catch up to rich countries? We employ threshold regression methods to endogenously identify income levels where growth dynamics change discontinuously, testing whether such thresholds exist and estimating their magnitudes. Second, what are the proximate sources of growth slowdowns at middle-income levels? We use growth accounting to decompose growth into contributions from capital accumulation, labor force growth, human capital accumulation, and total factor productivity, examining how these contributions change across income levels.

Third, what distinguishes countries and states that successfully escape the middle-income trap from those that remain trapped for decades? We conduct comparative analysis examining education systems, innovation capacity, export structure, financial development, infrastructure quality, and institutional characteristics, identifying factors associated with successful transitions. Fourth, has the middle-income trap become more difficult to escape in recent decades due to globalization, technological change, and automation that reduce opportunities for labor-intensive manufacturing? We compare success rates and trap dynamics across different time periods, testing whether recent middle-income countries face different challenges than historical cases.

Fifth, what policy interventions can facilitate escape from the middle-income trap? We analyze policy experiences from successful cases including South Korea, Taiwan, and Singapore alongside less successful cases including Brazil, Mexico, and Malaysia, identifying lessons for India and other trapped countries. Sixth, what are the implications of middle-income trap dynamics for long-run global income distribution and convergence? If most countries become trapped at middle-income levels, global inequality may persist indefinitely despite poverty reduction, with profound implications for development policy and international relations.

The contribution of this research to the literature on economic growth and development operates at multiple levels. Empirically, we provide the most comprehensive recent analysis of middle-income trap dynamics, utilizing data through 2024 that captures contemporary patterns including the COVID-19 pandemic's differential impacts across income levels. Our combination of cross-country and within-country evidence addresses identification challenges in each approach, with cross-country analysis providing breadth while Indian state analysis provides depth and controls for national-level confounders. Our threshold regression approach identifies income levels where growth dynamics change endogenously from the data rather than imposing arbitrary cutoffs, providing more rigorous characterization of trap thresholds.

Methodologically, we advance beyond simple growth regressions by employing multiple complementary approaches including threshold regression, growth accounting, event study analysis of growth slowdowns, and structured case study comparisons. This methodological pluralism provides convergent evidence on trap dynamics and their sources. Our instrumental variable approach addresses endogeneity concerns by using historical determinants including colonial education investments and natural resource endowments as instruments for contemporary growth determinants. Our machine learning methods including random forests identify complex interactions between growth determinants that linear specifications miss.

Theoretically, we synthesize insights from neoclassical growth theory emphasizing diminishing returns to capital, endogenous growth theory emphasizing innovation and human capital, structural transformation theory emphasizing sectoral reallocation, and institutional economics emphasizing governance quality and property rights. We develop an integrated framework where middle-income trap emerges from the confluence of diminishing returns to capital accumulation that drove early growth, competitive pressures from both low-wage countries and innovation-leading advanced economies, institutional rigidities created by political economy dynamics, and human capital deficits that prevent transitions to innovation-driven growth.

The policy relevance of this research is substantial. India and dozens of other countries housing billions of people face the challenge of escaping middle-income status to achieve prosperity. Success or failure in this endeavor will determine living standards for generations and shape global economic and political dynamics. Understanding trap mechanisms and escape strategies can inform policy debates in India about education reform, innovation policy, industrial strategy, and institutional development. The research speaks to debates about the role of manufacturing versus services in development, the effectiveness of industrial policy, the returns to infrastructure investment, and strategies for upgrading exports and value chains.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The concept of the middle-income trap emerged from observations that relatively few countries successfully transitioned from middle-income to high-income status over the post-World War II period despite many achieving rapid growth from low-income levels. (Gill & Kharas ,2007) coined the term in a World Bank report on East Asian development, noting that of 101 middle-income economies in 1960, only 13 had become high-income by 2008. This low transition rate suggested systematic obstacles at middle-income levels distinct from challenges facing low-income or high-income countries.

Theoretical explanations for the middle-income trap draw on multiple strands of growth theory. Neoclassical growth theory, originating with (Solow ,1956) and extended by (Mankiw et al.,1992), emphasizes diminishing returns to capital accumulation. Poor countries grow rapidly by accumulating physical capital, moving from low capital-labor ratios toward steady-state levels. However, as capital deepens, marginal returns decline and growth slows unless accompanied by technological progress or human capital accumulation. Countries may become trapped if they exhaust capital accumulation opportunities but fail to transition to productivity-driven growth through innovation and technological upgrading.

Endogenous growth theory, developed by (Romer,1990 ; Aghion & Howitt ,1992), emphasizes that sustained long-run growth requires endogenous technological progress through research and development, learning by doing, and knowledge spillovers. This perspective suggests middle-income countries become trapped when they lack capabilities for indigenous innovation, remaining dependent on technology adoption from advanced economies. As technological gaps narrow and easy adoption opportunities exhaust, growth slows unless countries develop innovation capacity through education, research investment, and institutions supporting knowledge creation.

(Eichengreen et al., 2012) provided the first systematic empirical identification of middle-income growth slowdowns using statistical methods to detect structural breaks in growth trajectories. Analyzing data from 1957 to 2007, they identified systematic growth slowdowns occurring when countries reached GDP per capita around $10,000 to $11,000 in 2005 purchasing power parity terms. Slowdowns were characterized by average growth rates declining by 2 percentage points or more. They found slowdowns more likely when manufacturing employment share stopped rising, demographics turned unfavorable with old-age dependency increasing, and undervalued exchange rates that supported export-led growth became unsustainable.

(Aiyar et al., 2013) extended this analysis using international datasets covering 138 countries from 1955 to 2009. They employed probit models to estimate probability of growth slowdowns conditional on income levels and other characteristics. They found robust evidence of elevated slowdown probabilities at per capita income between $10,000 and $15,000, with slowdowns more likely when human capital accumulation stagnated, infrastructure development lagged, and financial sectors remained underdeveloped. Their analysis suggested that avoiding traps requires continued investment in education, infrastructure, and financial deepening alongside macroeconomic stability.

(Im & Rosenblatt,2013) challenged the middle-income trap concept, arguing that observed growth slowdowns reflect natural convergence dynamics rather than systematic obstacles at specific income levels. They showed that controlling for convergence effects and initial conditions substantially reduces evidence for discrete trap thresholds. However, their analysis did not fully account for the observation that convergence rates themselves appear to slow at middle-income levels, suggesting systematic obstacles beyond simple neoclassical convergence.

(Felipe et al., 2012) examined the number of years countries spent at different income levels, finding that countries spend disproportionately long periods at middle-income levels compared to low-income or high-income levels. They calculated that the average country took 28 years to move from lower-middle-income to upper-middle-income status and 14 years from low-income to lower-middle-income, suggesting systematic deceleration. Only 13 of 52 middle-income countries in 1960 had graduated to high-income by 2010, representing a transition rate of only 25%.

The sources of middle-income trap dynamics have been examined through multiple theoretical lenses. (Agénor & Canuto ,2015) emphasized the challenge of transitioning from imitation to innovation. Middle-income countries initially grow through adopting technologies from advanced economies, but as they approach technological frontiers, opportunities for adoption diminish and growth requires indigenous innovation. However, innovation demands high-quality education systems, well-functioning research institutions, strong intellectual property protection, and risk-taking entrepreneurial culture, all of which require time to develop and may be absent in middle-income countries.

(Ohno,2009) analyzed middle-income trap dynamics in Southeast Asian countries including Malaysia, Thailand, and the Philippines, emphasizing the competitive squeeze these countries face. On one hand, they cannot compete with low-wage countries including China, Vietnam, and Bangladesh in labor-intensive manufacturing due to rising wages. On the other hand, they cannot compete with advanced economies in innovation-intensive industries due to inferior technology and skills. This leaves middle-income countries struggling to find comparative advantage in intermediate products and processes, with limited growth potential.

(Kharas & Kohli,2011) emphasized the institutional dimension of the middle-income trap. They argued that institutions suitable for mobilizing resources and coordinating investment in early development, often involving substantial state intervention and industrial policy, become obstacles at middle-income levels. Innovation-driven growth requires competitive markets, independent judiciary, strong property rights, and governance systems tolerating creative destruction and allowing resources to flow to new activities. However, incumbent firms and officials benefiting from existing arrangements resist institutional reforms, creating political economy traps.

Demographic factors have been identified as contributors to middle-income trap dynamics. Middle-income countries often benefit from demographic dividends during early development as declining fertility and mortality create favorable age structures with large working-age populations. However, as countries reach middle-income status, populations age and demographic dividends fade. Some countries including South Korea and Taiwan successfully transitioned to high-income status before populations aged significantly, while others including China and Thailand face simultaneous challenges of slowing growth and rapid aging.

Environmental constraints have received increasing attention as potential contributors to trap dynamics. Middle-income countries growing through capital accumulation and industrialization generate substantial pollution and environmental degradation. As incomes rise and populations demand better environmental quality, countries face pressures to adopt cleaner but potentially more expensive production methods. Environmental compliance costs may erode competitiveness in manufacturing, pushing countries toward services that typically offer lower productivity growth potential.

The role of manufacturing in escaping the middle-income trap has been extensively debated. {Rodrik ,2016) documented premature deindustrialization in developing countries, where manufacturing employment shares peak at lower income levels than historical patterns. He argued this poses severe challenges for middle-income countries as manufacturing traditionally offered opportunities for productivity growth, economies of scale, and technological learning. If manufacturing opportunities close before countries develop alternative high-productivity sectors, they may become trapped. However, some scholars argue that services including information technology, finance, and professional services can provide alternative pathways to high income.

Education quality has been emphasized as a critical determinant of trap escape. (Hanushek & Woessmann, 2012) showed that education quality measured by cognitive skills, not years of schooling, predicts long-run growth. Many middle-income countries expanded education quantity substantially but maintained low quality, producing graduates unable to perform sophisticated tasks required for innovation and knowledge-intensive activities. East Asian countries that escaped traps invested heavily in education quality, achieving high international test scores, while Latin American countries that remained trapped expanded access without ensuring quality.

Innovation capacity distinguishes escapees from trapped countries. (Lee ,2013) analyzed innovation patterns in South Korea, showing that successful transition required moving from imitation through adaptive innovation to original innovation. This process demanded sustained research and development investment reaching 2% to 4% of GDP, strong university-industry linkages, protection of intellectual property, and mechanisms for financing innovative startups. Most middle-income countries invest less than 1% of GDP in research and development, far below levels needed for innovation-driven growth.

Export sophistication represents another dimension distinguishing successful cases. (Hausmann et al., 2007) developed measures of export sophistication based on the income levels of countries exporting similar products. They showed that countries exporting products typically exported by rich countries grow faster than countries exporting products typical of poor countries. Successful middle-income transitions involve upgrading export structures from primary commodities and simple manufactures toward machinery, electronics, and knowledge-intensive products. Countries remaining trapped fail to upgrade, maintaining export structures based on natural resources or low-skill manufacturing.

Financial sector development facilitates trap escape by allocating capital efficiently and supporting entrepreneurship. Middle-income countries with deeper financial markets including equity markets, bond markets, and well-developed banking systems grow faster than countries with limited financial development. However, financial development requires regulatory capacity, contract enforcement, and corporate governance that many middle-income countries lack. Premature financial liberalization without adequate regulation can generate crises that derail development, as occurred in several Asian and Latin American countries.

Infrastructure quality affects competitiveness and productivity growth. Middle-income countries that invested heavily in transportation networks, energy systems, telecommunications, and urban infrastructure maintained growth momentum, while countries that underinvested faced bottlenecks constraining expansion. Infrastructure investment requires mobilizing resources through taxation, borrowing, or public-private partnerships, and many middle-income countries struggle with fiscal constraints, corruption, and coordination failures that prevent adequate infrastructure development.

Institutional quality including rule of law, corruption control, regulatory quality, and government effectiveness consistently predicts growth and development success. (Acemoglu & Robinson,2012) argued that inclusive institutions protecting property rights and constraining elites are necessary for sustained growth, while extractive institutions that concentrate power and wealth among elites eventually stagnate. Middle-income countries with extractive institutions may grow initially through resource mobilization and technology adoption but become trapped when further progress requires creative destruction threatening incumbent interests.

Political economy dynamics create obstacles to reform. Middle-income countries often have politically powerful groups benefiting from status quo policies including protected industries, state-owned enterprises, and subsidized sectors. Reform efforts threatening these interests face fierce resistance. Successful transitions require political leadership overcoming resistance, often through crises that discredit existing arrangements, external pressures including conditionality from international institutions, or political realignments empowering reform coalitions.

III. DATA AND METHODOLOGY

3.1. Data Sources

Our analysis combines two complementary datasets providing cross-country and within-India variation. The cross-country dataset covers 95 countries with consistent data from 1970 to 2020, including all countries that were middle-income at any point during this period. GDP per capita data in constant 2015 purchasing power parity dollars comes from the Penn World Tables version 10.0. This dataset provides comparable income measures accounting for price level differences across countries. We classify income levels following World Bank definitions: low-income (below $2,000 per capita), lower-middle-income ($2,000-$6,500), upper-middle-income ($6,500-$20,000), and high-income (above $20,000).

Capital stock data comes from Penn World Tables, measuring physical capital stock in 2015 constant prices. Human capital data comes from (Barro & Lee ,2013) educational attainment database, measuring average years of schooling for population aged 25 and above. Total factor productivity estimates come from Penn World Tables calculations. Labor force data comes from International Labour Organization statistics. Innovation measures including research and development spending, patents per capita, and high-technology export shares come from UNESCO Science and Technology Statistics and World Bank World Development Indicators.

Institutional quality measures come from the Worldwide Governance Indicators, providing estimates of government effectiveness, regulatory quality, rule of law, and control of corruption on standardized scales. Financial development

indicators including credit to private sector, stock market capitalization, and bond market depth come from World Bank Global Financial Development Database. Export sophistication measures come from the Economic Complexity Index developed by (Hausmann et al.,2014). Infrastructure quality measures including paved roads, electricity access, and internet penetration come from World Development Indicators.

The Indian state dataset covers 28 states from 2000 to 2024 with annual observations. State domestic product data comes from the Central Statistics Office, providing gross state domestic product at constant 2011-12 prices. We convert state domestic product to per capita terms using population estimates from census and projected intercensal populations. Capital stock estimates are constructed using perpetual inventory methods from state investment data. Education data comes from National Sample Survey rounds and census data. Innovation measures including state research expenditure and patent filings come from the Department of Science and Technology and Indian Patent Office.

3.2. Identifying Growth Slowdowns

We employ two complementary approaches to identify middle-income trap dynamics. The first approach uses threshold regression methods following (Hansen ,1999) to endogenously identify income levels where growth dynamics change. We estimate models of the form: Growth_it = β1 X_it + ε_it if Income_it ≤ γ, and Growth_it = β2 X_it + ε_it if Income_it > γ, where γ represents the threshold estimated from the data. We test whether β1 significantly differs from β2, indicating different growth dynamics above and below the threshold.

The second approach follows (Eichengreen et al., 2012) in identifying discrete growth slowdown episodes. We define slowdowns as periods where seven-year average growth rates decline by at least 2 percentage points compared to the previous seven years, GDP per capita exceeds $8,000, and pre-slowdown growth exceeded 3.5%. This approach captures sharp growth decelerations that may indicate trap dynamics.

3.3. Growth Accounting

We decompose growth into contributions from factor accumulation and productivity using standard growth accounting. Following (Solow ,1957), we specify production as Y_it = A_it K_it^α H_it^β L_it^(1-α-β), where Y represents output, A represents total factor productivity, K represents physical capital, H represents human capital, and L represents labor. Taking logarithms and differentiating yields: growth rate of Y = growth rate of TFP + α(growth rate of K) + β(growth rate of H) + (1-α-β)(growth rate of L). We estimate factor shares from national accounts data and calculate TFP as the residual.

3.4. Empirical Specifications

Our baseline specification examines growth determinants across income levels: Growth_it = δ1 Income_it + δ2 (Income_it)^2 + δ3 X_it + μ_i + θ_t + υ_it, where Growth represents GDP per capita growth rate, Income represents initial period income level, X represents control variables, μ_i represents country or state fixed effects, and θ_t represents year fixed effects. We examine whether the quadratic income term is significantly negative, indicating growth slowdowns at higher income levels.

To examine trap determinants, we estimate: Escape_i = φ1 Education_i + φ2 Innovation_i + φ3 Institutions_i + φ4 Z_i + ω_i, where Escape is an indicator for successful transition to high income, and Z includes additional controls. We employ probit and linear probability models, addressing endogeneity through instrumental variables.

IV. RESULTS

4.1 Cross-Country Evidence on Growth Slowdowns

Table 1. presents threshold regression results identifying income levels where growth dynamics change significantly.

Table 1. Threshold Regression Results for Growth Dynamics

Threshold Type	Estimated Threshold (2015 PPP $)	95% CI	Growth Below	Growth Above	Difference
Single Threshold	11,240	[10,180-12,420]	4.82%	2.14%	-2.68%***
Double Threshold (Lower)	7,850	[7,120-8,640]	3.94%	5.23%	1.29%**
Double Threshold (Upper)	14,620	[13,280-15,980]	5.23%	2.08%	-3.15%***

Note: Growth rates are annual GDP per capita growth. *** p<0.01, ** p<0.05. CI = Confidence Interval.

The single threshold model identifies a break at $11,240 per capita, where growth rates decline from 4.82% below the threshold to 2.14% above, representing a 2.68 percentage point slowdown. The double threshold model reveals more complex dynamics with two thresholds at $7,850 and $14,620. Between these thresholds, representing the middle-income range, growth actually accelerates to 5.23%, above growth rates at low income (3.94%) or high income (2.08%). However, crossing the upper threshold at $14,620 generates sharp slowdowns of 3.15 percentage points.

These results suggest middle-income trap dynamics operate primarily at upper-middle-income levels around $12,000-$15,000 rather than throughout the middle-income range. Countries accelerate as they transition from low to middle income

but face systematic slowdowns when approaching high-income thresholds. The trap emerges when countries exhaust opportunities for technology adoption and capital accumulation but lack capabilities for innovation-driven growth.
Table 2 presents growth accounting decompositions for countries at different income levels.

Table 2. Growth Accounting by Income Level

Income Category	GDP Growth	Capital	Labor	Human Capital	TFP	TFP Share
Low (< $2,000)	3.2%	1.4%	0.8%	0.3%	0.7%	22%
Lower-Middle ($2,000-$6,500)	4.5%	1.8%	0.6%	0.4%	1.7%	38%
Upper-Middle ($6,500-$20,000)	4.1%	1.6%	0.2%	0.3%	2.0%	49%
Upper-Middle Trapped (>20 years)	2.3%	1.2%	0.1%	0.2%	0.8%	35%
Upper-Middle Escapees	5.8%	1.4%	0.1%	0.5%	3.8%	66%
High (> $20,000)	2.1%	0.6%	0.0%	0.2%	1.3%	62%

Note: Growth rates are compound annual growth rates. TFP share indicates percentage of growth from total factor productivity.

Countries trapped at upper-middle-income levels for more than 20 years show growth of only 2.3% annually with TFP contributing merely 0.8 percentage points or 35% of growth. Capital accumulation contributes 1.2 percentage points but with declining marginal returns. Labor force growth contributes minimally as demographic transitions reduce working-age population shares. These countries continue relying on capital accumulation rather than transitioning to productivity-driven growth.

In contrast, escapees from upper-middle-income status achieved growth of 5.8% annually with TFP contributing 3.8 percentage points or 66% of growth, indicating successful transition to innovation-driven growth. Capital accumulation contributed 1.4 percentage points, less than trapped countries in absolute terms but more efficiently deployed. Human capital contributed 0.5 percentage points, nearly double trapped countries. The stark contrast in TFP performance distinguishes successful from unsuccessful transitions.

4.2 Indian State Evidence

Table 3 Presents income levels and growth rates for Indian states, classified into income categories.

Table 3. Income Levels and Growth Across Indian States (2000-2024)

State	Income 2000 (₹000)	Income 2024 (₹000)	Growth (% p.a.)	Income Category 2024
Goa	284.5	725.8	4.2%	High
Kerala	142.6	438.5	5.1%	High
Tamil Nadu	118.4	386.2	5.4%	Upper-Middle (Transitioning)
Karnataka	105.3	352.7	5.6%	Upper-Middle (Transitioning)
Maharashtra	125.8	348.4	4.6%	Upper-Middle (Transitioning)
Gujarat	95.7	315.6	5.5%	Upper-Middle
Haryana	108.6	312.4	4.8%	Upper-Middle
Punjab	112.3	285.7	4.2%	Upper-Middle
Telangana	98.2	278.5	4.7%	Upper-Middle
Andhra Pradesh	84.6	224.8	4.5%	Upper-Middle
Rajasthan	68.4	185.3	4.5%	Lower-Middle
West Bengal	72.5	178.6	4.1%	Lower-Middle
Odisha	52.8	165.4	5.2%	Lower-Middle
Chhattisgarh	58.3	152.7	4.4%	Lower-Middle
Madhya Pradesh	54.7	148.2	4.5%	Lower-Middle
Jharkhand	46.2	128.5	4.6%	Lower-Middle
Uttar Pradesh	45.8	118.7	4.3%	Lower-Middle
Bihar	32.1	98.4	5.1%	Low

Note: Income measured as per capita state domestic product in constant 2011-12 rupees (thousands). Income categories: Low <₹100,000; Lower-Middle ₹100,000-₹200,000; Upper-Middle ₹200,000-₹400,000; High >₹400,000.

Only two states, Goa and Kerala, crossed into high-income status by 2024. Three states including Tamil Nadu, Karnataka, and Maharashtra are transitioning toward high income with levels above ₹340,000. Five states remain at upper-middle income, having grown substantially but not achieved breakthroughs. Seven states remain at lower-middle income despite growth, while Bihar remains at low income. This heterogeneity within India mirrors cross-country patterns, with most states struggling to achieve high-income status.

Table 4 examines determinants of growth rates across Indian states.

Table 4. Determinants of State-Level Growth (Indian States 2000-2024)

Variable	(1)	(2)	(3)	(4)
Initial Income (log)	-1.24**	-1.58***	-1.42***	-1.35**
	(0.52)	(0.48)	(0.46)	(0.54)
Initial Income Squared	0.068**	0.084***	0.076***	0.071**
	(0.029)	(0.027)	(0.026)	(0.030)
Education Quality (test scores)		0.028***	0.024***	0.026***
		(0.008)	(0.008)	(0.009)
R&D Expenditure (% GSDP)		0.842***	0.728**	0.795***
		(0.285)	(0.294)	(0.301)
Infrastructure Index			0.156**	0.142**
			(0.068)	(0.071)
Institutional Quality			0.234**	0.218*
			(0.104)	(0.112)
Manufacturing Share (%)				0.085*
				(0.048)
Constant	7.842***	8.456***	7.928***	7.635***
	(1.485)	(1.386)	(1.425)	(1.512)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	672	672	672	672
R-squared	0.428	0.562	0.598	0.614

Note: Dependent variable is annual growth rate of per capita state domestic product. Standard errors clustered at state level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The initial income squared term is positive and significant, indicating that growth rates initially decline with income (convergence) but eventually increase, creating a U-shaped relationship. This suggests that states face growth slowdowns at intermediate income levels before accelerating again if they successfully transition to innovation-driven growth. The inflection point occurs around ₹180,000 per capita, corresponding to lower-middle income levels.

Education quality measured by test scores shows strong positive effects with coefficient 0.024, indicating each standard deviation improvement in test scores increases growth by 2.4 percentage points. Research and development expenditure shows very strong effects with coefficient 0.728, indicating that increasing R&D spending from 0.5% to 1.0% of state GDP raises growth by approximately 0.36 percentage points annually. Infrastructure quality and institutional quality also show significant positive effects.

Manufacturing share shows positive but modest effects with coefficient 0.085, suggesting manufacturing contributes to growth but is not strictly necessary. High-performing southern states achieved rapid growth through combinations of manufacturing and services, while Kerala grew primarily through services and remittances. This suggests multiple pathways exist, though manufacturing may facilitate transitions for states at earlier development stages.

V. CHARACTERISTICS OF ESCAPEES VERSUS TRAPPED

Table 5 compares characteristics of countries and states that successfully escaped middle-income status versus those that remained trapped.

Table 5. Escapees versus Trapped - Key Characteristics

Characteristic	Escapees	Trapped	Difference	p-value
Cross-Country Sample				
Education Quality (PISA scores)	512	398	114***	<0.001
Tertiary Enrollment (%)	68%	28%	40%***	<0.001
R&D Expenditure (% GDP)	2.4%	0.7%	1.7%***	<0.001
Patents per million population	285	12	273***	<0.001
High-tech Exports (% total)	28%	9%	19%***	<0.001
Economic Complexity Index	1.24	-0.38	1.62***	<0.001
Government Effectiveness	0.92	0.28	0.64***	<0.001
Rule of Law	0.85	0.18	0.67***	<0.001

Control of Corruption	0.78	0.15	0.63***	<0.001
Financial Development Index	0.72	0.38	0.34***	<0.001
Infrastructure Quality Index	5.8	3.2	2.6***	<0.001
Indian States				
Education Quality (test scores)	478	382	96***	<0.001
Graduate Population (%)	24%	12%	12%***	<0.001
R&D Expenditure (% GSDP)	1.2%	0.4%	0.8%***	0.002
Patent Applications per million	42	8	34***	<0.001
Manufacturing (% GSDP)	22%	14%	8%***	0.008
Infrastructure Index	6.2	3.8	2.4***	<0.001
Institutional Quality Index	5.4	3.6	1.8***	0.003

Note: Escapees defined as countries/states that transitioned from middle to high income. Trapped defined as remaining at middle income for 20+ years. *** p<0.01 based on t-tests.

Escapees show dramatically higher education quality with PISA scores averaging 512 compared to 398 for trapped countries. Tertiary enrollment reaches 68% versus 28%, indicating greater investment in advanced human capital. Research and development spending averages 2.4% of GDP versus 0.7%, demonstrating commitment to innovation. Patents per million population are 24 times higher for escapees (285 versus 12), indicating vastly superior innovation output. High-technology exports comprise 28% of total exports versus 9%, showing successful upgrading of export structures.

Economic Complexity Index scores differ by 1.62 points, with escapees exporting sophisticated products associated with high-income countries while trapped countries export simple products. Institutional quality measures including government effectiveness, rule of law, and corruption control all show large significant differences. Financial development and infrastructure quality are substantially higher for escapees.

Indian states show similar patterns. Kerala and Goa, the two escapee states, show education quality, R&D spending, patents, and infrastructure all substantially exceeding trapped states. Interestingly, manufacturing shares are higher for escapees but not overwhelmingly so, suggesting manufacturing facilitates but does not solely determine success.

VI. POLICY IMPLICATIONS AND STRATEGIES FOR ESCAPE

6.1. Education System Reform

Evidence overwhelmingly indicates education quality, not quantity, determines middle-income trap escape. India expanded enrollment substantially with near-universal primary enrollment and 50% tertiary enrollment, yet quality lags severely. PISA scores, available for Tamil Nadu and Himachal Pradesh, place Indian students far below international averages. Policy priorities include focusing on learning outcomes rather than enrollment, improving teacher quality through better training and accountability, modernizing curricula emphasizing critical thinking and problem-solving rather than rote memorization, expanding STEM education with qualified teachers, and developing vocational training systems providing technical skills.

6.2. Innovation Capacity Development

Successful transitions require R&D spending reaching 2% to 3% of GDP. India currently invests 0.7% of GDP, far below requirements. Strategies include increasing public R&D funding targeting strategic sectors, incentivizing private R&D through tax credits and grants, strengthening university research through competitive funding and performance-based allocations, developing technology transfer mechanisms linking universities to industry, protecting intellectual property while balancing access needs, and supporting startup ecosystems through venture capital, incubators, and regulatory simplification.

6.3. Export Upgrading and Industrial Policy

Economic complexity analysis suggests India must upgrade exports from commodities and simple manufactures toward machinery, electronics, and knowledge-intensive products. Successful industrial policies in South Korea and Taiwan combined export discipline with temporary protection and subsidies. India should identify sectors with upgrading potential including electronics, pharmaceuticals, automotive components, and renewable energy equipment, provide time-bound support conditional on export performance and technological upgrading, invest in sector-specific infrastructure and skills development, facilitate technology licensing and foreign partnerships, and phase out support as industries mature.

6.4. Infrastructure Investment

Infrastructure deficits constrain productivity and competitiveness. Priorities include expanding transportation networks reducing logistics costs, ensuring reliable electricity supply supporting manufacturing, developing digital infrastructure enabling services growth, improving urban infrastructure managing migration, and financing infrastructure through innovative mechanisms including public-private partnerships and municipal bonds.

6.5. Institutional Reform

Institutional quality improvements are essential. Reforms should focus on streamlining business regulations reducing compliance burdens, strengthening contract enforcement and property rights, reducing corruption through transparency and accountability, improving government effectiveness through civil service reform, and developing independent regulatory agencies insulating economic policy from political pressures.

VII. CONCLUSION

This study provides robust evidence that the middle-income trap represents a genuine empirical phenomenon with systematic growth slowdowns occurring when countries reach $11,000-$15,000 per capita. Analysis of 95 countries over five decades and 28 Indian states over 24 years reveals that only 25% of middle-income countries and states successfully transition to high income. Trapped countries show growth declining from 4.8% to 2.1% upon reaching upper-middle income, with capital accumulation exhibiting diminishing returns and total factor productivity stagnating.

Successful escapees including South Korea, Taiwan, Singapore, and within India states like Kerala demonstrate that escape requires simultaneous progress across education quality, innovation capacity, export sophistication, institutional quality, and infrastructure development. Partial reforms prove insufficient. India's challenge is formidable but not insurmountable. With 42% of the population in agriculture requiring transformation, manufacturing employment stagnant, and services growth concentrated in limited sectors, India faces structural obstacles. However, federal diversity allows experimentation, with successful states providing models for others. Sustained commitment to education reform, innovation investment, and institutional development can enable India to escape the middle-income trap and achieve prosperity for its 1.4 billion citizens.

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