

Why Some Countries Can Survive the Middle-Income Trap – Based on an Empirical Analysis of Different Countries and Regions

*Xiaoshan Liu; Xindong Zhao; Fang Zhao**

Abstract

The middle-income trap fundamentally reflects a challenge in sustaining economic growth. To escape this trap, it is essential to identify sources of sustainable growth. This study systematically investigates the factors that facilitate overcoming the middle-income trap by using panel data from 29 countries spanning 1990 to 2022. A double fixed-effects model and a variable coefficient model are employed to empirically assess the impact of economic structural transformation, institutional quality, openness, and participation in global value chains on escaping the middle-income trap. The results indicate that, on a broad scale, patent applications and global value chain positioning positively influence the economic growth of countries that have successfully crossed the trap, suggesting these factors are conducive to overcoming it. Political institutional quality and goods trade also positively affect the growth of both groups of countries, although their influence on escaping the trap is not decisive. Further analysis, incorporating national endowments, reveals that human capital, patent applications, and industrial upgrading generally foster growth in countries that have transcended the trap. Institutional quality notably enhances growth in countries with stronger institutions, while foreign investment, goods trade, and global value chain status positively impact countries with greater openness to the global economy. These findings underscore the importance of considering a country's unique resource endowments in the pursuit of economic growth. Finally, policy recommendations are made in four areas: industrial upgrading and technological innovation, education reform and skills training, political system reform and governance capacity building, and enhancing national cooperation and openness.

Keywords: *middle-income trap, economic growth, international comparison, variable coefficient panel model*

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1 INTRODUCTION

From a global development perspective, the challenge of escaping the middle-income trap represents a significant obstacle for middle-income countries. The majority of countries and regions have encountered developmental impediments in their transition to high-income status, primarily due to their inability to capitalize on strategic windows of transition and successfully transform their economic development models. This has resulted in an inadequate driving force for economic growth. Since 1990, only 34 middle-income economies have successfully transitioned to high-income status. The number of the middle-income economies has continued to increase, with 108 countries included in middle-income group.¹ A significant proportion of the countries have been in this stage for an extended period, with Peru, Colombia, South Africa, and Venezuela being cases in point, having been in the middle-income trap (MIT) for more than 60 years, and some have even fallen back into the ranks of low-income countries. Also some economies, like Japan, South Korea, and Singapore, have made the leap from middle to high income in a period of approximately 10 years. Countries that successfully grow into high-income nations are usually able to choose development strategies that are suitable for their own realities. Faced with a more complex and volatile international environment, countries have different driving forces to overcome the middle-income trap based on different domestic economic growth and social development. Based on such conditions, what targeted policies should be adopted by countries with different resource endowments in order to maintain long-term stable economic growth and avoid falling into the middle-income trap? In view of such problems, this paper has important theoretical and practical significance.

This paper adopts the multivariate panel regression model and the variable coefficient panel regression model to analyze the factors affecting the per capita income of countries and regions that have fallen into and crossed the middle-income trap. It focuses on three aspects: potential for economic structural transformation, governance system and policy environment, and opening up to the outside world. The analysis summarizes how countries that have successfully grown into high-income countries have done so, and the reasons why countries that have fallen into the trap have done so. It then provides specific recommendations to help avoid this trap.

This paper involves three aspects. First, it will present a detailed factual exposition on the middle-income trap, exploring its existence and providing a concise summary and commentary on its definition. Second, it will methodically review the theoretical underpinnings and the formation mechanisms of the middle-income trap. Third, it will use the double fixed effect model and variable coefficient panel regression model to explore the core driving force of economic growth in different stages of development, so as to clarify the driving factors for

¹ The data is sourced from the World Bank.
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countries with different development characteristics to cross the middle-income trap at the present stage. This paper enriches and expands the relevant research on the middle-income trap, and helps to identify middle-income countries from a more scientific perspective. It provides a framework for understanding the challenges faced by countries with different development endowments in overcoming the middle-income trap. The paper also puts forth feasible suggestions on how to promote the crossing of the middle-income trap.

2 LITERATURE REVIEW

2.1 Definition of the middle-income trap

Contemporary discourse surrounding the conceptualization of the middle-income trap remains contentious. Gill and Kharas (2007) first defined a middle-income country as a state of economic stagnation that can be defined as a specific stage of development. The extant scholarly literature predominantly analyzes the middle-income trap definition from three distinct vantage points: declining growth rate, weak convergence and growth differentiation. Aiyar et al. (2018) judged the middle-income trap from the perspective of economic slowdown. They found that after an economy enters the middle-income stage, the possibility of economic slowdown is significantly higher than that of other income groups. National income per capita or GDP per capita is generally used to assess whether a country has fallen into the middle-income trap. Felipe et al. (2012) argued that in order to cross the middle-income trap, a country needs to achieve a growth rate of 4.7% in the lower middle-income range and 3.5% in the upper middle-income range. Eichengreen et al. (2012, 2013) argued that only when the following two conditions are met, a country is considered to have crossed the middle-income trap: the growth rate of per capita income must be greater than or equal to 3.5%, and the period of rapid growth must be a minimum of seven years. Certain studies have adopted a more lenient stance, proposing that when the time of being in the middle-income stage is continuous, a country can be considered to be in the middle-income trap (Prajapati et al., 2023). Weak convergence is defined as the failure of middle-income economies to significantly narrow the gap with advanced economies over the long term, or even to widen the gap (Lee, 2020). The middle-income trap, as defined in this way, is often measured by the ratio of a country's per capita income to that of the United States. Robertson and Ye (2013) measured the dynamic trend of the ratio of per capita income between middle-income economies and the United States. They believed that if the ratio of a middle-income economy tends to be stable for a long time and is lower than the high-income threshold, it may fall into a trap. Woo (2012) used a purchasing power parity method to estimate the per capita GDP of each country and constructed the catch-up index as a percentage of the level of the United States, and employed it to measure the relative development level of a country. Growth differentiation is defined as the failure to transition to a high value-added economic

model, owing to the imbalanced distribution and solidification of growth drivers in middle-income economies. From a global perspective, it is challenging for these countries to gain a share of the global market, due to an imbalanced distribution of production factors and the stabilization of development conditions (Lee & Ramanayake, 2018).

Scholars have begun to define the middle-income trap from the perspective of national development. The middle-income trap is believed to be rooted in a structural contradiction between the institutional structure and the production capacity in the process of national industry (Hartmann et al., 2019). Andreoni and Tregenna (2020) argued that middle-income countries have one thing in common: they cannot join the ranks of leading industrialized countries. Hartmann et al. (2021) have indicated through empirical analysis that the core challenge facing developing economies in the process of industrial transformation lies in how to realize the transition from labor-intensive primary processing to the top of the knowledge-intensive value chain.

2.2 Influencing factors of falling into the middle-income trap

The fundamental reason why middle-income economies fall into the middle-income trap is the failure to timely change the driving mechanism of economic growth, so the essence of the middle-income trap is the problem of economic growth (Zhang, 2013). The hypothesis of conditional convergence of economic growth was proposed by Barro & Sala-i-Martin (1997). They believed that the convergence of economic growth rates would occur between regions with similar or identical economic growth conditions. In the process of economic convergence and the crossing of income levels, the middle-income stage is the most difficult one to cross. Therefore, focusing on the late-comer advantage and economic catch-up of middle-income countries can help identify the reasons for falling into the trap. In these studies, almost all factors related to economic growth are mentioned, such as population structure, technological progress, development strategy, macroeconomic management, and upgrading of industrial structure. As the core of leapfrogging the middle-income trap, innovation capacity has attracted much attention as a key driver of economic growth in developing countries (Paus, 2017; Glawe & Wagner, 2020a; Feki & Mnif, 2016; Baumol, 2004).

Innovation is widely regarded as a key driver of total factor productivity and economic growth (Schumpeter, 1934). Neoclassical economic theories also underscore the vital role of technological progress in the process of economic growth (Solow, 1956). Building on these theoretical concepts, subsequent studies have conducted empirical analyses of the impact of innovation on overcoming the middle-income trap. Most scholars believe that the relative growth rate of technology is the fundamental reason for determining whether a country falls into the middle-income trap (Paus, 2019; Kang & Paus, 2019). Only if its technological growth rate is faster than that of developed countries can it break out of the middle-income trap (Gong et

al., 2017; Barro, 2016). Agénor and Canuto (2015) identified the gap between technological absorption capacity and the complexity of frontier technologies as a key driver of the “imitation-to-innovation transition dilemma”, which serves as a core mechanism leading to growth traps at the middle-income stage. Expanding the concept of technological innovation to total factor productivity, Amin et al. (2023) analyzed differences in firm-level labor productivity between high-income and middle-income economies. Their findings suggest that enhancing managerial capabilities, fostering innovation, and improving workforce skills are crucial for narrowing the productivity gap in middle-income economies. Bulman et al. (2017) and Bianchi et al. (2024) also proposed the common determinants of countries falling into the middle-income trap, such as lagging technological innovation, stagnant productivity growth, and insufficient education and skill improvement. As an important factor affecting total factor productivity, human capital has also been analyzed by many scholars for its impact on crossing the middle-income trap. In the context of the challenges of the Fourth Industrial Revolution and automation, enhancing human capital accumulation will be a key success factor in overcoming the middle-income trap (Glawe & Wagner, 2020b; Lee et al., 2019). Technical education and vocational skills training have a crucial role in crossing the middle-income trap (Doner & Schneider, 2019).

The core issue of the middle-income trap lies in institutional rigidity, which hinders technological upgrading and structural transformation (Acemoglu & Robinson, 2012). At the institutional level, scholars often emphasize the role of institutional or policy support in avoiding or overcoming the trap. Lee (2019), through an analysis of countries that successfully transcended the middle-income trap, highlighted the critical role of policies and institutions in driving economic transformation. Gado (2021) found that low transparency leads to insufficient innovation investment, which in turn causes low growth. Additionally, some studies have explored the issue from the perspective of the social demand structure, focusing on how income inequality exacerbates the risk of economies falling into the middle-income trap. These studies suggest that inequality inhibits economic transformation to higher income stages by suppressing total factor productivity and exacerbating social instability (Hu et al., 2023). High-quality characteristics, such as the rule of law, governance efficiency, and market transparency can foster technological innovation, industrial upgrading, and enhanced productive capacity, thereby increasing a country’s economic complexity (Vu, 2022). Industrial policies that support technological innovation, industrial diversification, and the enhancement of productive capacity are beneficial in overcoming the middle-income trap (Andreoni & Tregenna, 2020). Research by Lebdioui et al. (2021) indicates that by adjusting industrial policies and combining resource-based industries with technological innovation, countries can reduce their dependence on primary resource exports and thus avoid the middle-income trap.

At the current stage of development, the increasingly severe international market environment may adversely affect the crossing of the middle-income trap. Most scholars believe that a

leading position in foreign trade helps to cross this trap (Michalski, 2022). Naseemullah (2022) argued that the structure of trade, investment, and global value chains significantly affects the economic growth of middle-income countries. Moreover, export complexity, product concentration, and market diversification are essential for sustainable growth, as they mitigate the risk of falling into the middle-income trap (Akbas & Sancar, 2021). However, Bianchi et al. (2023) found a strong positive relationship between export profitability and economic growth in middle-income trap countries, but not in those that have successfully transitioned. Bresser-Pereira et al. (2020) noted that trade and financial liberalization led to prolonged exchange rate overvaluation, diminishing manufacturing competitiveness and fostering deindustrialization and stagnation. Raj-Reichert (2019) argued that globalization facilitated integration into global value chains, with many middle-income countries participating in low value-added production. This dependency, however, may hinder their economic transformation, locking them into the middle-income trap and obstructing upward mobility to higher value-added industries. Similar conclusions have been reached by Kang and Paus (2019), Paus (2019), and Paus et al. (2023).

Although the current research on the middle-income trap provides abundant theoretical and empirical evidence, there are still some shortcomings. First, the empirical research on the middle-income trap in the existing literature mainly analyzes a single type of factors, and the comprehensive research on multiple factors is relatively insufficient. Second, the majority of extant studies use the fixed effect panel model to analyze the factors of a group of countries as a whole, instead of studying countries with different development conditions in different periods. Therefore, this paper employs a fixed effects model and a variable coefficient panel model to select various influencing factors and study their effects on countries that have escaped the middle-income trap and those that have fallen into it, along with a comparative analysis.

3 THEORETICAL ANALYSIS OF THE IMPACT OF THE MIDDLE-INCOME TRAP CROSSING

The question of why some countries are able to overcome the middle-income trap is essentially an exploration of the drivers of sustained economic growth. Therefore, this paper conducts a theoretical analysis of the impact of overcoming the middle-income trap from three perspectives: the potential for economic structural transformation, the level of institutions, and the degree of openness to the outside world and the position in the global value chain.

3.1 Potential for economic structural transformation

Endogenous growth theory emphasizes the critical role of knowledge accumulation, technological innovation, and human capital in driving long-term economic growth. Technological progress is central to economic growth and industrial upgrading. First, it directly

enhances production efficiency and labor productivity. The widespread adoption of automation and digital technologies enables workers to produce higher-quality goods in less time. By incorporating efficient production technologies, such as automated production lines and smart manufacturing, firms can lower production costs and improve product competitiveness, thus stimulating economic growth. Second, technological innovation facilitates industrial upgrading, particularly the shift from low value-added to high value-added sectors. While traditional industries are often labor-intensive and inefficient, high-tech industries tend to exhibit higher labor productivity, capital intensity, and greater innovation. As the economy transitions toward higher value-added industries, the more efficient use of resources—such as capital, technology, and labor—boosts total factor productivity. Furthermore, industrial restructuring optimizes resource allocation, enhancing production efficiency. Technological advancements also support globalization, enabling countries to integrate more effectively into global value chains. By adopting advanced technologies, countries can secure competitive advantages both domestically and internationally. Technology transfer and collaboration with multinational corporations and international partners further accelerate technological progress and foster domestic industrial upgrading, thereby driving sustained economic growth.

3.2 Institutional Level

North (1990) conceptualizes the institutional environment as a framework of political, social, and legal rules governing production, exchange, and distribution. An effective system influences the efficiency of resource allocation across society. Institutions foster specialization and exchange by mitigating uncertainty. Furthermore, well-established systems—such as clear property rights and enforceable contract law—reduce market transaction costs by addressing information asymmetry, contract disputes, and performance risks. The protection of property rights further ensure that investors' return expectations are met, thereby stimulating long-term capital investment and technological innovation. Competitive markets, coupled with reduced government intervention (e.g., combating corruption and dismantling monopolies), enhance the efficiency of capital and labor allocation. The fiscal and taxation systems, through taxation and transfer payments, can balance the interests of various groups, provide basic social security and public services, promote social equity, and maintain social stability. Additionally, the social service and security systems work in conjunction with fiscal policies to form a critical mechanism for social redistribution. A robust social service system reduces the financial burden on individuals and families, thereby improving living standards and social welfare. Political stability and a rule of law environment mitigate the risk of sudden policy changes, bolstering long-term confidence among businesses and individuals.

3.3 Opening Up and Integration into Global Value Chains

The process of opening up fosters development by leveraging the dual forces of international trade and cross-border capital flows, serving as a key pathway for middle-income countries to achieve industrial transformation. Grounded in the theoretical framework of dynamic comparative advantage, the international division of labor allows economies to align industries with their factor endowments, optimizing resource allocation through specialized labor divisions. In the realm of international trade, an export-oriented strategy enables firms to transcend domestic market boundaries and achieve economies of scale while simultaneously optimizing production processes in response to international market competition. The importation of capital goods and technology-intensive intermediate products facilitates technology transfer, establishing a material foundation for enhancing industrial technological capabilities. Regarding cross-border capital flows, foreign direct investment (FDI) generates multifaceted economic benefits. In terms of capital formation, it directly addresses the savings-investment gap of the host country. From a technology diffusion perspective, multinational enterprises foster knowledge spillovers through demonstration effects, competitive pressures, and personnel exchanges—key mechanisms driving total factor productivity (TFP) growth in new growth theory. Notably, competition and collaboration between foreign and domestic firms can disrupt market monopolies and stimulate innovation ecosystems. Additionally, job creation expands domestic demand through income transmission mechanisms, fostering a synergistic growth dynamic between supply and demand. Amid the ongoing restructuring of global value chains, the industrial upgrading of developing countries exhibits new patterns. Participation in international production networks enables firms to access more technologically advanced production stages and absorb cutting-edge technologies and managerial expertise through “learning by doing”. However, caution is required to avoid the technology dependence trap—a scenario in which the host country’s technological absorption capacity lags behind its innovation capabilities, potentially leading to technological path dependence. It is also crucial to recognize that the alignment between value chain positioning and factor endowment structures determines the potential for industrial upgrading; excessive reliance on primary production factors may obstruct this progression.

4 VARIABLE SELECTION, MODEL SETTING AND DATA SOURCE

4.1 Middle-income trap country sample selection

The middle-income trap is a prevalent phenomenon. After reaching the initial stage of industrialization, some developing countries experience rapid economic growth through factor-driven strategies, thereby attaining middle-income status. However, these countries often face the exhaustion of growth drivers, resulting in prolonged stagnation within the middle-income class. Following the methodology of Felipe et al. (2012), this paper defines countries that fail to

transition to high-income status within 28 years, or that fail to achieve high-income status within 14 years, as being in the middle-income trap. However, this approach presents two key issues. First, relying solely on mean income statistics tends to underestimate regional wealth disparities, which is especially problematic in samples of developing countries. Additionally, as a single economic dimension, mean income fails to adequately capture critical elements of modern society, such as social equity, governance quality, public welfare levels, and human capital accumulation. To address these limitations, this paper introduces national development and social equity indicators. National development is assessed using the Human Development Index (HDI). Countries that successfully transition beyond the middle-income trap typically exhibit high HDI scores, while those with lower HDI scores are more prone to remaining trapped. However, there are exceptions, such as Argentina, which despite having a high HDI, remains caught in the middle-income trap. This is largely attributed to the significant income inequality within the country. To quantify this inequality, the Gini coefficient is introduced as a measure of income or wealth distribution. Notably, many countries that have remained in the middle-income range for extended periods exhibit high Gini coefficients, including Brazil (0.53), South Africa (0.63), Argentina (0.42), and Thailand (0.43).

The grouping method employed in this paper is as follows: first, countries that are persistently in the middle-income stage, as well as those that have transitioned from the middle-income to the high-income stage, are selected. The World Bank classifies countries into low, middle, and high-income groups based on a GNI per capita threshold, as shown in Table 1. Considering both the HDI and the Gini coefficient, countries that have moved from lower development stages to very high human development (over 0.8) are classified as having crossed the middle-income trap. Conversely, countries with a Gini coefficient exceeding the international warning threshold (0.4) are deemed at risk of falling into the trap. The final classification results are presented in Table 2.

Tab. 1 – Classification criteria for different income stages (USD)

Type of income	1990	2000	2010	2020	2023
Low income	<=610	<=755	<=1005	<=1045	<=1145
Lower-Middle Income	611-2465	756-2995	1006-3975	1046-4095	1146-4515
Upper-middle income	2466-7620	2996-9265	3976-12275	4096-12695	4516-14005
High income	>7620	>9265	>12275	>12695	>14005

Source: World Bank

Tab. 2 – Grouping of economies

Groups	Countries
Countries Trapped in the Middle Income Trap	Asia Malaysia, the Philippines, Mongolia, Iran, Iraq, Lebanon, Thailand, Jordan

		Algeria, Angola, Botswana, Cabo Verde, Cameroon, Congo, Rep., Côte d'Ivoire, Djibouti, Gabon, Libya, Mauritius, Namibia, Senegal, South Africa, Tunisia, Zimbabwe, Morocco, Eswatini
	Africa	Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Mexico, Guatemala, Suriname, El Salvador, Costa Rica, Cuba, Dominica, St. Lucia, St. Vincent and the Grenadines, Nicaragua, Grenada, Dominican Republic, Belize, Jamaica
	Latin America	Vanuatu, Tonga, Samoa, Papua New Guinea, Kiribati, Fiji
	Oceania	Albania, Turkiye
	Europe	Barbados, Trinidad and Tobago, Uruguay
	Latin America	
	Asia	Bahrain, South Korea, Oman, Saudi Arabia
	Europe	Bulgaria, Croatia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Russian Federation, Slovenia
	Africa	Seychelles

Source: World Bank

4.2 Variable selection, model setting and data source

Dependent variables. The World Bank classifies different stages of economic development based on GNI per capita. Since the GDP and GNI of most countries are highly consistent, and considering the breadth and availability of data, the GDP indicator is superior to GNI. Therefore, we use GDP per capita instead of GNI per capita as the basis for categorizing different stages of development. Data is sourced from the World Bank's WDI database.

Explanatory variables. (1) Potential for economic structural transformation. This study measures this potential using indicators of innovation, human capital, and industrial transformation and upgrading. Innovation is represented by the number of patent applications filed by residents. Human capital is measured using a Human Capital Index, based on years of schooling and returns to education, sourced from the Penn World Table 10.01. Industrial transformation and upgrading are represented by the proportion of medium and high-tech exports in total commodity exports. (2) Governance system and policy environment. The quality of the political system is assessed by summing the political system risk variables from the ICRG method, with data obtained from the ICRG database. (3) Openness and participation in global value chains. The degree of openness is represented by the share of foreign direct investment in GDP and the share of merchandise trade in GDP. The Global Value Chain Position Index is calculated following the method of Koopman et al. (2010), using raw data from the TiVA database published by the OECD. Variables not otherwise specified are derived from the World Bank's WDI database.

Control variables. Since the central focus of this study is economic growth, additional variables influencing economic growth are also considered. These include capital stock, labor participation rate, infrastructure level, and social democracy. The labor force participation rate is measured as the percentage of the working-age population (15-64 years). Infrastructure level is represented by fixed telephone subscriptions per 100 people, all sourced from the World Bank's WDI database. Social democracy is assessed by public discourse and accountability, with data obtained from the World Governance Index (WGI) database.

Due to data limitations, the sample covers 29 countries over a 32-year period (1990-2022), and includes key economic and social indicators such as economic structural transformation potential, institutional quality, and participation in global value chains. Some variables have missing values for certain countries and regions. Descriptive statistics for these variables are provided in Table 3.

Tab. 2 – Variable Description Statistics

Variables	Abbreviation	Mean		SD	
		Crossed	Trapped	Crossed	Trapped
GDP per capita	$\ln y$	10.10	9.06	0.39	0.69
Innovation	x_1	9561.29	819.76	30712.81	1385.85
Human capital	x_2	2.97	2.31	0.36	0.44
Industrial transformation and upgrading	x_3	44.57	43.44	16.59	20.14
Quality of the political system	x_4	66.53	64.75	22.08	7.34
Foreign direct investment	x_5	7.90	2.79	33.67	2.29
Merchandise trade	x_6	79.07	58.00	35.00	35.45
Participation in global value chains	x_7	0.12	0.16	0.19	0.15
Infrastructure level	c_1	31.23	11.69	13.08	7.23
Labor participation	c_2	67.46	61.55	5.99	10.12
Social democracy	c_3	0.58	-0.01	0.82	0.54
Capital stock	c_4	13.55	14.00	1.57	1.34

With reference to the selected variables, the logarithm of each country's GDP per capita is taken as the dependent variable, and the two-way fixed effect model is selected for analysis according to the test. The model is set as follows:

$$\ln Y_{it} = \beta_0 + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 x_{6it} + \beta_7 x_{7it} + \delta_1 c_{1it} + \delta_2 c_{2it} + \delta_3 c_{3it} + \delta_4 c_{4it} + \lambda_t + \varepsilon_{it} \quad (1)$$

Where i denotes country, t denotes year, and λ_t represents time effect.

5 EMPIRICAL TESTING AND ANALYSIS OF RESULTS

5.1 Fixed Effects Model

Due to the differentiated development of economies and societies in different countries, heterogeneity characteristics will emerge among individuals of economic variables, and the classical panel model is not suitable for analyzing similar issues. This paper introduces variables related to economic structural transformation potential, governance systems, policy environments, and openness and global value chains into the double fixed effects model, analyzing the effects of these variables on overcoming the middle-income trap, as shown in Table 4.

Tab. 3 – Regression analysis results of different types of countries

Variables Method	Crossed FEM	Trapped FEM	Crossed FEM	Trapped FEM
Dependent variable	ln y	ln y	ln y	ln y
x_1	3.09e-06 (4.45)***	9.95e-06 (0.13)	2.39e-06 (3.80)***	0.00004 (3.91)***
x_2	-0.5118 (-3.19)***	-0.2909 (-2.13)***	-0.5291 (-3.43)***	-0.5431 (-6.88)***
x_3	-0.0011 (-1.02)*	0.0002 (0.16)	0.0016 (1.81)*	0.0012 (1.07)
x_4	0.0039 (5.20)***	0.0049 (2.32)**	0.0036 (7.05)***	0.0036 (2.02)**
x_5	7.53e-06 (0.02)	0.0054 (1.28)	-0.0003 (-1.23)	0.0099 (2.45)**
x_6	0.0011 (1.98)**	0.0032 (3.07)***	0.0004 (0.77)	0.0029 (3.59)***

x_7	0.5904 (2.64)***	0.3642 (1.41)	0.1547 (0.78)	0.5946 (2.58)**
c_1	-0.0065 (-3.78)***	0.0021 (0.79)		
c_2	0.0168 (4.54)***	0.0023 (0.61)		
c_3	0.1482 (3.06)***	-0.0335 (-1.10)		
c_4	0.0387 (0.73)	0.3114 (2.90)***		
Cons	9.3241 (11.72)***	4.5946 (2.90)***	10.8456 (25.88)***	9.5478 (42.46)***
Individual Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Observations	279	288	361	337
R^2	0.8399	0.6820	0.8291	0.6732
Groups	14	14	15	14

Note: *** indicates $p < 0.01$, ** indicates $p < 0.05$, * indicates $p < 0.1$.

As shown in Table 4, the number of patent applications significantly promotes economic growth in countries that have transitioned beyond the middle-income trap, while its impact is not significant for countries that remain trapped. This suggests that innovation output can foster economic growth in countries that have crossed the middle-income threshold, but does not significantly affect those still within the trap. By encouraging increased R&D investment by enterprises and research institutions, patents can spur the development of new technologies and products, thereby enhancing productivity and stimulating economic growth. In countries that have crossed the middle-income trap, the increase in patent numbers often corresponds with a transition from labor-intensive to technology-intensive industries. Through patent protection, these countries can safeguard innovation outcomes, providing incentives for further technological research and development. High value-added products and services can thus improve national competitiveness and foster economic growth. In contrast, for countries trapped in the middle-income trap, the low level of innovation, coupled with a small number or poor quality of patents, prevents innovation from driving economic development. Patents fail to be effectively translated into productive outcomes, rendering them ineffective in promoting growth.

The effect of human capital is significantly negative for both groups of countries. In countries that have crossed the middle-income trap, this may be due to the diminishing marginal returns of human capital. Additionally, economic growth in these countries increasingly depends on technological innovation rather than human capital enhancement. Moreover, as economies

evolve toward more complex industries, educational systems may struggle to meet the demand for high-end skills, thereby weakening the positive impact of human capital. For countries trapped in the middle-income trap, education systems often suffer from underfunding, disparities in quality, and urban-rural divides, resulting in an overall low quality of human capital. Although these countries may have high labor force participation, the low quality of education and human capital hampers economic growth. In some cases, an increase in human capital may exacerbate resource inefficiency. Furthermore, stagnant growth, political instability, and an inability to effectively absorb and utilize human capital further hinder productivity improvements. Even with educational improvements, insufficient economic momentum and investment opportunities prevent human capital from translating into increased productivity, thus explaining the negative correlation between human capital growth and economic performance.

The proportion of medium and high-technology exports negatively impacts economic growth in countries that have crossed the middle-income trap, with no significant effect in countries still trapped. For countries that have crossed the trap, the transition from labor-intensive to skill-intensive industries has generally been completed. However, these countries may face challenges in industrial upgrading, particularly in an increasingly competitive global environment. Despite progress in medium and high-technology sectors (such as high-tech products, precision instruments, and innovative services), the share of these products in global value chains may remain limited. Furthermore, the transition away from manufacturing dependency and infrastructure may be incomplete, resulting in a low or even declining share of medium and high-tech exports in the short term. For countries trapped in the middle-income trap, their economies typically rely on low value-added industries or natural resource exports (e.g., oil and minerals) and lack the technological innovation or industrial diversification needed to drive higher value-added sectors. Although technological upgrading may occur in some areas, overall economic structural transformation progresses slowly, with insufficient investment and innovation capacity to fuel the rapid growth of high-tech industries. Consequently, the low or declining share of medium and high-tech exports signals a failure to achieve meaningful economic growth or structural transformation.

The quality of political institutions has a significantly positive effect on the economic growth of both groups of countries, with a larger coefficient for countries that are still trapped. A higher political risk value in the ICGR index indicates a better institutional environment. For countries that have crossed the middle-income trap, more stable political institutions provide a stable foundation for growth and better management of development risks. In contrast, countries trapped in the middle-income trap face greater political institutional risks due to weak governance, high corruption, and fragile rule of law. Increased political risk often leads to social instability and economic uncertainty, undermining the effectiveness of economic policies and

hindering reform and innovation. The fragility of political systems in these countries exacerbates the negative impacts of political risk, resulting in stagnant economic growth and an inability to break out of the middle-income trap.

The ratio of FDI to GDP does not significantly affect the economic growth of either group of countries. FDI, akin to domestic investment, directly impacts output; however, for countries that have crossed the middle-income trap, economic development has shifted from reliance on foreign capital to greater dependence on internal innovation, technological progress, and high value-added industries. As a result, the marginal contribution of foreign capital to growth diminishes. In countries trapped in the middle-income trap, foreign capital tends to seek short-term profits rather than long-term industrial upgrading and technology investment, playing a limited role in accelerating economic growth.

Trade in goods has a positive effect on the economic growth of both groups, with a larger impact in countries that remain trapped. This may be because, although trapped countries face challenges in industrial upgrading, they can still promote trade and growth through resource exports (e.g., Latin American countries and South Africa) and labor-intensive exports (e.g., Southeast Asia). However, this growth is often unsustainable. For countries that have crossed the middle-income trap, successful industrial upgrading enables the transition from low value-added goods to high value-added exports. For example, South Korea and Taiwan have driven trade growth through the development of high-tech industries like electronics, machinery, and automobiles. The export of these high value products not only boosts merchandise trade but also fosters overall economic growth.

The global value chain status index significantly positively impacts the economic growth of countries that have crossed the middle-income trap, but has no significant effect for those still trapped. This suggests that integration into the global value chain fosters growth in transitioning countries, as it enhances industrial value-added through participation. By engaging in the global value chain, these countries accumulate technological and managerial expertise, bolstering their innovation capabilities. Additionally, as these countries upgrade their position within the value chain, they can better respond to changes in global market demand and adapt to evolving market conditions. In contrast, trapped countries face constraints in global demand for their low value products and lack the capacity to respond swiftly to market changes. Even with some improvements in their position within the value chain, these countries struggle to leverage external economic shifts as a sustainable growth driver.

5.2 Endogeneity and robustness tests

The fixed effect model can absorb individual characteristics that do not change with time (such as geography and culture) and time trends that do not change with time (such as macroeconomic shocks) through fixed effects, thus reducing the endogeneity caused by omitted variables. At

the same time, according to the Barro regression framework and the new growth theory, this paper controls the classical variables such as capital and labor, and introduces endogenous growth factors such as R&D output, human capital, and institutional quality. At the same time, the factors that occur at the same time as the core variables are considered, including social democracy and other variables, so it can be considered that the selection variables are relatively comprehensive. The previous low correlation of the contemporaneous variables can be considered to ignore the endogeneity problem. Therefore, the two-way fixed utility model is still used to test the robustness of the previous estimation results by changing the explained variables. In this paper, the catch-up index is used as the explained variable for model regression, and the regression results are shown in Table 5. By comparing the estimation results of the model with per capita GDP as the explained variable, it is found that the coefficient values of the model with catch-up index as the explanatory variable are basically the same in size and direction as those of the benchmark model, which proves the robustness of the research results in this paper.

Tab. 5 – Robustness test: Replace the dependent variable

Variables Method	Crossed FEM	Trapped FEM	Crossed FEM	Trapped FEM
Dependent variable	<i>cui</i>	<i>cui</i>	<i>cui</i>	<i>cui</i>
x_1	1.82e-06 (5.69)***	9.10e-06 (4.37)***	1.62e-06 (3.80)***	1.55e-05 (10.70)***
x_2	-0.1963 (-2.65)***	-0.0413 (-2.44)**	-0.1965 (-3.43)***	-0.0851 (-6.69)***
x_3	-0.0009 (-1.74)**	0.0006 (2.68)***	0.0002 (1.81)	0.0006 (3.12)***
x_4	0.0015 (4.46)***	0.0012 (3.65)***	0.0016 (6.69)***	0.0006 (2.26)**
x_5	1.35e-05 (0.13)	0.0011 (1.55)	-0.0001 (-1.15)	0.0014 (2.10)**
x_6	0.0004 (1.66)*	0.00009 (0.62)	-9.49e-06 (-0.04)	2.37e-05 (0.18)
x_7	0.2449 (2.56)**	-0.0723 (-1.73)*	-0.0207 (-0.23)	-0.0463 (-1.25)**
c_1	-0.0017 (-2.18)**	-0.0009 (-2.04)**		
c_2	0.0098 (5.77)***	0.0013 (2.24)**		

	0.0906	-0.0152		
C_3	(5.77) ^{***}	(-3.10) ^{***}		
	0.0147	0.0456		
C_4	(0.60)	(2..63) ^{***}		
	-7.53e-06	-0.5076	0.8591	0.3248
Cons	(-0.00)	(-1.98) ^{**}	(4.55) ^{***}	(48.96) ^{***}
Individual Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Observations	279	288	361	337
R^2	0.6374	0.6498	0.5823	0.6058
Groups	14	14	15	14

Note: * * * indicates $p < 0.01$, * * indicates $p < 0.05$, * indicates $p < 0.1$.

5.3 Heterogeneity analysis

Given the substantial development disparities across countries, this paper employs a variable coefficient panel model to analyze the heterogeneity among nations. Separate national models are constructed for countries that have crossed the middle-income trap and those that remain trapped. This approach allows for a more nuanced examination of the factors influencing the successful transition of countries in different regions. Before examining the impact of different factors on different countries, this paper briefly summarizes the development status of various countries in order to better analyze the heterogeneous results (Tab. 6).

Tab. 6 – Comparison of countries crossing the MIT

Area	Countries	Core economic industries	Resource/strategic advantage
AS	South	Automotive	1. Investment in science and technology
	Korea	Electronics	2. Universalization of education
	Saudi Arabia	Oil export	1. World's largest oil reserves
			2. Geopolitical leverage
EU	Estonia	Digital economy	1. EU funding support
		Information technology	2. Digital governance lead
	Latvia	Logistics manufacturing	1. Attracting Nordic investment
			2. Joining the eurozone
			3. Baltic logistics hub, low-cost labor
	Lithuania	FinTech	1. Strategic location of the port
		Manufacturing	2. Access to the EU market

Poland	Automotive manufacturing	1. EU structural funds support
	Electronics foundry	2. Labor cost advantages
Greece	Tourism	3. Central European transportation hubs
	Shipping	1. Mediterranean tourism resources
Portugal	Renewable energy	2. EU subsidies
	Textiles	1. EU finances energy transition
Slovenia	Pharmaceuticals	2. Atlantic port advantages
	Automotive parts	3. Low-cost labor
Croatia	Tourism	1. Highly skilled labor
	Agriculture	2. China-Europe trade corridor
Hungary	Automobile manufacturing	1. Tourism resources
	Electronics	2. EU market integration
Malta	Offshore finance	1. Central European geographic center
	Tourism	2. EU industry chain nodes
Romania	IT outsourcing	3. Vocational and technical education reforms
	Automotive manufacturing	1. English language popularization
Georgia	Energy	2. EU smallest member state flexibility
	Military	1. Silicon valley of Eastern Europe
Bulgaria	Mechanical and electronics manufacturing	2. Low-cost labor
	Agriculture and food processing	1. World's largest natural gas exporter
		2. Low-cost labor
		1. EU integration dividend
		2. Tax and business environment optimization
		3. Education and skills training reforms

The countries that have successfully crossed the middle-income trap, as included in this study, are primarily located in Europe and Asia. The factors driving their transition from middle-income to high-income status are diverse, but can be broadly categorized as follows: (1) International cooperation and support: countries such as Bulgaria, Croatia, Poland, Portugal, Romania, and Lithuania have benefited from financial aid, market access, and policy support by joining international organizations like the European Union, thereby fostering economic modernization and structural adjustment. (2) Resource-based economies: nations like Saudi Arabia and Russia have experienced rapid growth through energy exports. (3) Technology and innovation: technological advancements and digital transformation have been pivotal in driving high-income transitions. Estonia, Lithuania, and South Korea, for instance, have leveraged information technology, digital reforms, and innovation-driven economies to become high-

income economies. (4) Sector-specific development: certain countries have relied on robust sector-specific industries, such as tourism, financial services, and high-tech industries, as primary drivers of growth. Greece and Malta, for example, have prospered through tourism and financial services, while Estonia, Lithuania, and South Korea have relied on the rapid expansion of information technology and innovative sectors. (5) Labor force quality and education: a highly skilled labor force has been a critical factor for many nations in achieving high-income status. Countries like South Korea, Slovenia, and Estonia have invested heavily in education and human capital development, providing a strong foundation for sustained economic growth.

This paper analyzes the results of the variable coefficient model in light of the unique circumstances of each country that has crossed the middle-income threshold (Tab. 7). First, concerning economic structural transformation, technological innovation-related variables generally exert a positive and significant effect on economic growth in countries that rely on technological development, such as Romania. Human capital similarly has a positive impact on the majority of countries in the sample that have successfully transitioned out of the middle-income trap. For example, Eastern European nations like Estonia and Hungary have accelerated education system reforms since joining the European Union, fostering a skilled workforce that has contributed to rapid economic growth in technology sectors. In South Korea, human capital has been effectively translated into technology-intensive industrial productivity through the expansion of higher education and industry-university research collaborations. In Latvia, Lithuania, and Poland, human capital plays a crucial role in attracting foreign direct investment (FDI), facilitating industrial upgrading. Conversely, for Greece and Saudi Arabia, human capital negatively influences economic growth. Greece suffers from a high unemployment rate, undermining the effectiveness of its human capital and hindering productivity improvements. In Saudi Arabia, the private sector heavily relies on foreign workers for technical roles, and domestic human capital is less engaged in productive activities. In Croatia and Bulgaria, the impact of human capital is negligible, with both countries experiencing a loss of highly skilled young workers and a low proportion of STEM graduates, which impedes the conversion of human capital into productivity.

The quality of the political system shows a significant positive correlation with the economic performance of most European countries in the sample, primarily due to their membership in the European Union, which ensures relatively high institutional quality. However, Russia and Saudi Arabia, with their centralized political systems, low government efficiency, opaque regulations, and rent-seeking behaviors, experience suppressed national investment and innovation, thus hindering economic growth.

From the perspective of openness, foreign investment has a significantly positive impact on economic growth in Estonia, Bulgaria, Latvia, Poland, Romania, and the Russian Federation. This is likely due to these countries' successful promotion of technology transfer, job creation, <https://doi.org/10.7441/joc.2025.03.09>

and capital accumulation through the inflow of foreign capital during their economic transformations. Particularly in Eastern European countries such as Poland, Romania, and Bulgaria, foreign investment in infrastructure, manufacturing, and services has played a critical role in economic development. In Russia, despite its complex economic structure and geopolitical challenges, foreign investment in sectors such as energy and technology has had a positive effect on growth. Conversely, foreign investment has had a negative impact on Malta's economy. This may stem from an overconcentration of foreign capital in specific industries, such as financial services or tourism, leading to resource misallocation and crowding-out effects in other sectors. Furthermore, excessive foreign capital inflows may cause economic overheating or asset bubbles, which negatively affect growth.

Commodity trade has a negative impact on economic growth in certain countries, such as Russia and Romania, and no significant impact in others. This may be due to the reliance of these countries on exports of resource-based products and low value-added goods, which offer limited trade benefits and may even lead to phenomena like the resource curse or Dutch disease,² impeding long-term growth. Additionally, many of these countries are highly dependent on domestic energy exports, which are susceptible to international price fluctuations and geopolitical instability, further hampering growth. In contrast, countries like Saudi Arabia, Russia, and Malta, with their upstream or midstream positions in the global value chain, have gained substantial economic momentum from energy, resources, or services. As a result, their global value chain position index has a significantly positive impact on their economic growth. However, Greece, Hungary, Lithuania, Poland, and Portugal, positioned downstream in the global value chain with low value-added sectors, have not fully capitalized on the potential benefits of global value chains. Instead, they face challenges from international competition and structural imbalances, which undermine their growth prospects.

Tab. 7 – Results of the model for countries crossing the MIT

Countries	x_1	x_2	x_3	x_4	x_5	x_6	x_7
Bulgaria	-1.83E-04 (-0.35)	0.94 (1.47)	1.45E-02 (2.80)***	-6.68E-03 (-1.36)	4.49E-03 (2.37)**	-4.78E-04 (-0.32)	0.41 (0.73)
Croatia	4.20E-04 (2.29)**	0.29 (1.65)	8.13E-03 (1.78)*	2.26E-04 (0.32)	4.92E-03 (1.22)	-2.50E-04 (-0.09)	-1.44 (-1.51)
Estonia	-6.28E-04 (-0.74)	1.39 (4.77)***	-5.05E-03 (-0.95)	-1.49E-04 (-0.18)	6.96E-03 (2.83)***	3.82E-04 (0.44)	0.16 (0.50)
Greece	3.62E-04 (4.47)***	-0.88 (-3.58)***	1.30E-02 (7.26)***	6.05E-03 (2.18)***	-3.67E-04 (-0.03)	-8.70E-03 (-2.72)***	-1.80 (-5.69)***

² Dutch disease is an economic term for the negative consequences that can arise from a spike in the value of a nation's currency.

Hungary	1.83E-04 (1.11)	0.90 (3.07)***	-6.66E-03 (-1.58)	2.22E-02 (3.32)***	1.72E-04 (0.45)	-1.41E-03 (-1.06)	-1.89 (-2.19)**
Slovenia	-1.19E-04 (-1.02)	0.83 (1.76)*	4.04E-03 (1.02)	9.59E-04 (2.81)***	8.28E-04 (0.37)	-2.25E-03 (-1.21)	-0.97 (-1.07)
Latvia	1.94E-05 (0.12)	2.31 (6.85)***	-4.77E-04 (-0.20)	1.09E-03 (1.78)*	1.37E-02 (2.78)***	-4.18E-03 (-2.55)**	-0.72 (-1.14)
Lithuania	-3.08E-05 (-0.08)	1.51 (6.12)***	4.72E-03 (1.59)	7.77E-04 (1.66)*	3.12E-03 (1.14)	-5.08E-04 (-0.82)	-1.46 (-2.85)***
Malta	2.92E-03 (1.95)*	1.91 (5.61)***	-6.66E-04 (-0.70)	5.93E-03 (1.84)*	-2.81E-04 (-4.4)***	1.61E-03 (1.58)	1.28 (5.97)***
Poland	2.74E-05 (1.71)*	2.24 (8.26)***	-2.08E-03 (-1.11)	-2.10E-03 (-0.79)	1.18E-02 (2.57)**	-1.65E-02 (-5.49)***	-2.74 (-4.13)***
Portugal	-2.31E-04 (-1.88)*	0.67 (1.67)*	-8.17E-03 (-1.15)	1.28E-02 (3.69)***	-2.65E-03 (-0.86)	-1.09E-02 (-3.56)***	-2.54 (-2.61)***
Romania	9.77E-05 (2.48)**	1.46 (3.82)***	4.31E-03 (1.75)*	1.18E-03 (0.24)	1.02E-02 (1.83)*	-3.48E-03 (-2.17)**	0.18 (0.64)
Russia	7.72E-06 (3.49)***	0.59 (2.60)***	-6.59E-03 (-3.41)***	-3.99E-03 (-2.4)**	1.24E-02 (1.84)*	-6.60E-03 (-3.75)***	1.30 (2.07)**
Saudi Arabia	3.09E-04 (2.55)**	-0.56 (-1.71)*	-8.49E-04 (-0.65)	-2.23E-02 (-2.48)**	1.03E-02 (1.44)	-1.30E-04 (-0.06)	2.70 (1.92)*
South Korea	-1.21E-06 (-1.42)	0.99 (4.65)***	2.52E-03 (0.53)	1.23E-03 (0.22)	-1.85E-03 (-0.09)	-2.41E-03 (-0.60)	-0.74 (-1.11)

Note: *** indicates $p < 0.01$, ** indicates $p < 0.05$, * indicates $p < 0.1$.

Next, further analysis will be conducted on the development performance of countries trapped in the middle-income trap. The countries analyzed in this study are primarily located in Latin America, Asia, and Africa, as is shown in Table 8. Based on the underlying causes of stagnation, they can be broadly categorized into resource-dependent economies, service-driven economies, and geo-economically advantaged economies. Resource-dependent countries, such as Argentina, Brazil, Peru, and South Africa, rely heavily on commodity exports and are highly susceptible to price fluctuations. Service-driven economies, including Costa Rica, the Philippines, and Jordan, depend primarily on tourism or outsourcing services, lacking a robust industrial base. Geo-economically advantaged countries, such as Mexico, Turkey, and Malaysia, attract foreign investment due to their strategic location but have struggled to translate this advantage into technological progress. Despite their structural differences, these economies share common challenges, including industrial homogeneity, policy instability, low educational attainment, and external vulnerabilities.

Tab. 8 – Comparison of countries trapped in the MIT

Area	Countries	Driving force	Reasons for falling into the MIT
LATAM	Argentina	Agriculture and resource exports	1. Single economic structure 2. Policy instability and debt crisis 3. Failure of industrial upgrading
	Brazil	Resource exports Manufacturing base	1. Resource dependence and social inequality 2. Political corruption and ineffective governance 3. Deindustrialization
	Colombia	Oil and mineral exports Agricultural diversification	1. Security and drug issues 2. Poor infrastructure 3. Resource-dependent economy
	Peru	Mining Economy	1. Mining-led fragility 2. Regional imbalance 3. Political instability
	Mexico	Manufacturing exports Geo-economic advantages	1. Low-end manufacturing trap 2. High cost of crime and corruption 3. Over-dependence on external markets
	Costa Rica	High-end service industry	1. Single economic structure 2. High public debt 3. Hollowing out of manufacturing industry
	Jordan	Remittances and foreign aid Regional service industry hub	1. Resource scarcity and geopolitical risks 2. Rigid economic structure 3. High youth unemployment rate
AS	Turkiye	Manufacturing exports Geo-hub status	1. Currency and debt crisis 2. Non-market policy intervention 3. Geopolitical conflict
	Malaysia	Electronics manufacturing and resource exports	1. Bottleneck of industrial upgrading 2. Constraints of racial policies 3. Resource dependence

AF	Philippines	Service Outsourcing Remittance Economy	1. Hollowing out of manufacturing industry 2. Lagging infrastructure 3. Oligopoly
	Thailand	Tourism OEM manufacturing	1. Political turmoil impacts investment 2. Dilemma of technological imitation 3. Dependence on tourism
	Tunisia	European-oriented light industry tourism	1. Failure of political transition 2. Disconnection between education and employment 3. Dependence on external markets
	South Africa	Mining Financial services industry	1. The legacy of apartheid 2. Deindustrialization and the power crisis 3. Systemic corruption
	Morocco	Agriculture and phosphate exports Emerging manufacturing	1. Agricultural climate vulnerability 2. Locked in the low end of the industrial chain 3. Unbalanced urban and rural development

Compared to countries that have successfully escaped the middle-income trap, a larger number of countries in the sample exhibit a negative relationship between technological innovation, industrial upgrading, and economic growth (Tab. 9). However, for Colombia, Malaysia, and the Philippines, patent activity positively contributes to growth. While Colombia's economy remains heavily reliant on oil and mining, recent policy efforts have prioritized technological innovation and industrial diversification. Government initiatives to foster innovation have driven a steady increase in patent filings, spurring economic growth. Notably, Colombia leads Latin America in biotechnology patents, advancing biopharmaceuticals and agricultural technology, facilitating non-traditional industries, and generating high-skilled employment. Malaysia and the Philippines leverage their strengths in electronics manufacturing, information technology, and business process outsourcing, where patent applications have supported technological advancements in software development, artificial intelligence, and data analytics.

The effects of human capital and industrial structure on the middle-income trap are predominantly negative. In the case of human capital, labor market inefficiencies—including skill mismatches, rigid employment regulations, and a disconnect between education quality and market demand—likely constrain growth. Most countries trapped in the middle-income

category rely on low-tech industries, where human capital contributes less to economic expansion. From an industrial structure perspective, these economies often exhibit undiversified production bases, heavily dependent on traditional industries while lacking competitiveness in technology-intensive sectors, slowing structural adjustments. For instance, despite Thailand's expanding manufacturing sector, its technological upgrading and innovation progress remain sluggish. Additionally, in several countries, particularly in Latin America, political instability and inconsistent policy implementation have hindered industrial upgrading and technological innovation.

Institutional quality significantly enhances economic growth in Mexico, Argentina, Jordan, and Tunisia, likely reflecting recent improvements in legal frameworks and property rights protection. Mexico has attracted substantial foreign investment and stimulated growth through North American Free Trade Agreement membership and institutional reforms. Jordan, as a relatively stable Middle Eastern economy, has fostered tourism and services by improving the business climate and attracting foreign capital. Post-Arab Spring, Tunisia has strengthened the rule of law and anti-corruption measures, enhancing its economic environment. Although Argentina faces economic volatility, targeted institutional reforms—such as reducing government intervention and strengthening property rights—have bolstered growth in certain periods.

The impact of foreign investment appears insignificant across the sample, likely due to institutional deficiencies, weak absorptive capacity for technology, limited industrial diversification, and insufficient domestic demand. By contrast, trade exhibits a significant positive effect on growth in Mexico, Jordan, and Malaysia. Jordan's strategic location has positioned it as a key logistics hub between the Middle East, Europe, and Africa, with transit trade constituting a substantial share of total trade and contributing to economic expansion. Mexico and Malaysia have leveraged their comparative advantages in exports to improve economic efficiency while simultaneously upgrading local technological capabilities through technology transfer.

The global value chain (GVC) position index presents mixed effects: it positively influences economic growth in Turkey, Malaysia, and Tunisia but negatively impacts Argentina, Costa Rica, Mexico, and South Africa. In Turkey, Malaysia, and Tunisia, a higher GVC position index reflects increased technological capabilities and export competitiveness, facilitated by strategic geographic positioning (Turkey as a bridge between Asia and Europe, Malaysia at the core of Southeast Asia, and Tunisia's proximity to Europe) and a solid industrial base. In contrast, for Argentina, Costa Rica, Mexico, and South Africa, a higher GVC position index suggests entrenchment in low value-added segments of global production. These economies rely heavily on primary product exports or simple processing—such as Argentina's agricultural sector and South Africa's resource exports—making them vulnerable to external market fluctuations and

deteriorating trade conditions. Furthermore, excessive dependence on GVC participation has constrained domestic industrial upgrading and innovation, ultimately limiting long-term growth potential.

Tab. 9 – Results of the model for countries trapped in the MIT

Countries	x_1	x_2	x_3	x_4	x_5	x_6	x_7
Argentina	3.73E-05 (0.97)	-1.32 (-5.45)***	-7.62E-05 (-0.02)	6.32E-03 (1.92)*	1.39E-03 (0.32)	-2.99E-03 (-0.81)	-2.78 (-2.98)***
Brazil	2.81E-05 (1.13)	-0.56 (-6.30)***	-4.30E-03 (-1.61)	7.70E-04 (0.29)	8.79E-03 (1.40)	3.67E-03 (0.88)	0.98 (1.47)
Colombia	2.52E-04 (2.11)**	-0.94 (-4.00)***	2.24E-03 (0.71)	4.25E-03 (1.52)	3.46E-03 (0.35)	1.13E-03 (0.22)	0.45 (1.65)
Peru	5.89E-04 (0.86)	-0.26 (-1.33)	7.59E-03 (0.85)	-5.07E-03 (-1.47)	5.70E-03 (1.06)	3.46E-03 (1.26)	-0.58 (-1.15)
Costa Rica	8.40E-04 (0.80)	-0.45 (-1.33)	9.33E-05 (0.07)	1.99E-04 (0.05)	-7.06E-03 (-0.84)	7.63E-04 (0.52)	-1.06 (-2.11)**
Mexico	-1.66E-04 (-2.94)***	-1.43 (-3.91)***	3.09E-03 (0.29)	1.01E-02 (3.12)***	-7.62E-03 (-1.02)	5.46E-03 (1.94)*	-1.58 (-3.49)***
Jordan	-2.05E-04 (-0.07)	-0.58 (-1.88)*	3.60E-03 (0.72)	2.27E-02 (2.78)***	-5.03E-03 (-0.58)	7.58E-03 (3.16)***	2.02 (1.40)
Turkiye	-9.32E-07 (-0.05)	-0.10 (-0.29)	2.69E-03 (0.47)	4.04E-03 (1.18)	1.49E-02 (1.25)	4.33E-03 (1.46)	1.98 (2.58)**
Malaysia	5.54E-04 (8.04)***	-2.69 (-7.49)***	-1.01E-03 (-0.34)	-4.68E-03 (-0.94)	-3.03E-03 (-0.43)	4.31E-03 (3.80)***	2.23 (2.90)***
Philippines	3.56E-04 (1.77)*	-0.68 (-1.49)	9.08E-04 (0.49)	-1.32E-03 (-0.37)	3.09E-03 (0.19)	-9.43E-04 (-1.14)	-0.37 (-1.03)
Thailand	4.91E-05 (0.62)	-0.32 (-1.35)	-2.13E-03 (-0.36)	-2.29E-03 (-0.68)	-1.83E-02 (-1.28)	6.06E-03 (1.09)	2.40 (1.20)
Tunisia	-4.30E-04 (-1.15)	-0.24 (-1.25)	3.85E-03 (1.29)	9.66E-03 (3.65)***	-2.50E-03 (-0.62)	5.41E-04 (0.50)	1.27 (1.73)*
South Africa	-8.87E-05 (-1.14)	-1.15 (-4.35)***	-4.38E-02 (-6.78)***	-3.89E-02 (-4.11)***	9.74E-03 (0.25)	-1.69E-02 (-2.18)***	-3.90 (-4.21)***
Morocco	-6.61E-05 (-0.49)	0.27 (0.72)	-7.71E-03 (-2.27)**	-2.07E-03 (-0.52)	2.10E-03 (0.20)	-7.83E-04 (-0.48)	0.47 (1.35)

6 CONCLUSIONS, DISCUSSIONS AND SUGGESTIONS

This study classifies countries based on the method of Felipe et al. (2012), identifying those persistently in the middle-income stage and those that have transitioned to high-income status. It further incorporates the Human Development Index and the Gini coefficient into the analysis. Using data from 1990 to 2022, the empirical analysis employs a two-way fixed effects model and a varying-coefficient model to assess the impact of economic structural transformation potential, institutional quality, and global value chain integration on economic growth. The analysis compares 14 economies that remain in the middle-income trap with 15 that have successfully escaped it. The findings yield key conclusions and inform the following policy recommendations.

6.1 Conclusions

The results of the two-way fixed effects model indicate that the quality of political institutions and goods trade positively influence economic growth in both groups of countries, whereas human capital exhibits a negative effect. Patent applications and global value chain participation significantly enhance economic growth in leapfrogging countries but have no substantial impact on trapped countries. Industrial upgrading negatively affects leapfrogging countries but does not significantly influence trapped countries. Foreign investment is not a significant determinant for either group.

To further examine the heterogeneous effects of these factors across countries with different endowments, this study employs a variable-coefficient model, yielding the following insights. In leapfrogging countries, human capital generally fosters economic growth, whereas in trapped countries, its impact is either negative or insignificant. Patent applications and industrial upgrading contribute significantly to economic growth in leapfrogging countries but offer limited benefits to trapped economies. Institutional innovation strongly promotes economic growth in nations with high institutional quality, such as those in the European Union, but hinders growth in Latin America. Foreign investment significantly impacts economic growth in some leapfrogging countries but remains largely irrelevant for trapped nations. Similarly, goods trade and global value chain participation support economic growth in countries like South Korea and Turkey but tend to exert negative or negligible effects on trapped economies. A detailed analysis of these findings is conducted in the context of country-specific characteristics.

6.2 Discussions

This study extends the criteria for identifying the middle-income trap beyond those used in previous research. The ongoing progression of globalization, the evolving complexities of domestic and international environments, and the rapid advancements of the Fourth Industrial Revolution necessitate a reassessment of the factors influencing countries' transitions beyond

the middle-income trap from a fresh perspective. This paper builds on such an analysis and presents empirically robust findings. Notably, some variables traditionally recognized as growth-enhancing yield negative or statistically insignificant results at the aggregate level. However, when examined at the country level, these variables exhibit positive effects in certain cases, suggesting that their impact is contingent on country-specific economic structures, institutional settings, or stages of development. For instance, while patent applications and exports of medium and high-tech products may have reached a saturation point in South Korea—rendering their effects insignificant or even negative—the same variables remain growth-promoting in countries with lower levels of innovation. When all countries are analyzed together, these heterogeneous effects may offset each other, leading to ambiguous aggregate results. By contrast, country-specific regressions better capture the distinct contributions of these variables to economic growth. Moreover, variables associated with the middle-income trap tend to have a positive impact on countries that have successfully transitioned beyond the trap, while their effects are weak or negative for countries that remain trapped. These findings align with theoretical expectations, reinforcing the notion that such variables can indeed facilitate economic advancement.

The results also raise further questions. To what extent do these variables contribute differently across countries with varying resource endowments? What is the magnitude of these contributions? Due to space limitations, these issues remain open for future research.

6.3 Recommendations

Based on the findings presented, this paper compares the endowments of countries trapped in the middle-income trap with those that have successfully transitioned, offering practical policy recommendations for facilitating escape from the trap.

(1) To foster sustainable growth, it is essential to promote the shift from resource-dependent or low value-added manufacturing to technology-intensive and high value-added industries. This transformation enhances economic competitiveness.

Governments should implement industrial policies that support the diversified development of key sectors. Resource-dependent countries such as Argentina and Brazil can draw lessons from those that have successfully transitioned, such as Saudi Arabia, Russia, and Poland. These nations have accelerated industrial upgrades and innovation, transitioning from energy exports to high value-added industries. Strategic emerging sectors like green energy, smart manufacturing, biotechnology, and information technology should be prioritized, reducing excessive dependence on traditional resource-based industries. Establishing industrial innovation funds would encourage enterprises to invest in R&D, facilitating the development of industries aligned with future trends. For countries reliant on manufacturing and labor-intensive industries, such as Malaysia, Thailand, Mexico, and Colombia, enhancing domestic industry

competitiveness can be achieved through the in-depth development of industrial and supply chains, thereby increasing product value and reducing reliance on low-end manufacturing. A key focus should be the support of independent research and development (R&D) in core and advanced technologies, especially in high-tech fields like semiconductors, artificial intelligence, and new materials. Policies encouraging investment in technological transformation, smart production, and digitalization should be adopted in countries with stable governance and favorable business environments. Strengthening collaboration with global technology leaders can facilitate technology transfer and innovation.

(2) Improving labor force quality and meeting the demand for high-skilled labor are critical to driving industrial upgrading, intellectual support, and innovation for sustainable economic development.

Unlike countries that have successfully transitioned, many nations trapped in the middle-income trap face weak education systems and labor market imbalances. Reforming education systems, particularly technical and vocational education, is crucial. Education reforms should align curricula with industrial needs, promote STEM (science, technology, engineering, and mathematics) education, and improve the quality of skills training. A lifelong education system is necessary to keep pace with technological advancements and labor market shifts. Promoting international cooperation in education and talent exchange can improve domestic education systems and attract high-quality global resources. For countries with relatively developed education systems, governments should incentivize the attraction of scientific and technological talent, particularly in fields like artificial intelligence, big data, and renewable energy, through tax incentives and competitive remuneration packages.

(3) Enhancing governance capacity through political system reform is essential to ensuring policy stability, transparency, and the sustainability of long-term economic growth.

Research indicates that countries trapped in the middle-income range often suffer from political instability, lack of coherence, and weak governance, which hampers economic development. To address this, establishing a transparent legal system based on the rule of law is imperative. Combating corruption and ensuring fairness in the legal system will improve government credibility and execution. Trust between governments and society can be strengthened by enacting transparent fiscal and economic policies. Political reforms should focus on enhancing political stability, minimizing policy fluctuations, and improving policy implementation efficiency. In addition, democratic political participation and greater transparency in public decision-making will help reduce political uncertainty's negative impact on economic growth. For countries with high inequality, promoting a robust social security system—covering health, education, and pensions—will ensure basic protection for all citizens, contributing to social stability and fostering a conducive environment for growth.

(4) Strengthening international cooperation enhances a country's position in the global economy, promotes cross-border investment and technological collaboration, and fosters the opening of domestic markets.

Manufacturing powerhouses and small economies should deepen international trade cooperation, engage in regional economic integration, and expand participation in free trade agreements. By optimizing trade policies, reducing tariffs, and lowering non-tariff barriers, these countries can enhance the global competitiveness of their industries. Resource-rich and manufacturing-based countries can leverage their resources and labor to attract foreign investment and technology, stimulating rapid economic growth. Measures such as improving the foreign investment environment, streamlining regulations, and offering tax incentives can attract foreign firms, particularly in high-tech and innovation sectors. Collaborating with multinational companies will also facilitate technology transfer and innovation. Furthermore, all middle-income trap nations should work to strengthen their economic resilience and establish robust global economic cooperation mechanisms to effectively respond to external shocks during global crises.

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References

1. Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Business.
2. Agénor, P.-R., & Canuto, O. (2015). Middle-income growth traps. *Research in Economics*, 69(4), 641–660. <https://doi.org/10.1016/j.rie.2015.04.003>
3. Aiyar, S., et al. (2018). Growth slowdowns and the middle-income trap. *Japan and the World Economy*, 48, 22–37. <https://doi.org/10.1016/j.japwor.2018.07.001>
4. Akbas, Y. E., & Sancar, C. (2021). The impact of export dynamics on trade balance in emerging and developed countries: An evaluation with middle-income trap perspective. *International Review of Economics & Finance*, 76, 357–375. <https://doi.org/10.1016/j.iref.2021.06.014>
5. Amin, M., Islam, A. M., & Khalid, U. (2023). Why are firms in high-income economies more productive than in middle-income economies? Decomposing the firm labor productivity gap. *Studies in Comparative International Development*, 58(4), 645–674. <https://doi.org/10.1007/s12116-023-09387-y>
6. Andreoni, A., & Tregenna, F. (2020). Escaping the middle-income technology trap: A comparative analysis of industrial policies in China, Brazil, and South Africa. *Structural Change and Economic Dynamics*, 54, 324–340. <https://doi.org/10.1016/j.strueco.2020.05.008>
7. Barro, R. J. (2016). Economic growth and convergence, applied to China. *China & World Economy*, 24(5), 5–19. <https://doi.org/10.1111/cwe.12172>

8. Barro, R. J., & Sala-i-Martin, X. (1997). Technological diffusion, convergence, and growth. *Journal of Economic Growth*, 2(1), 1–26. <https://doi.org/10.1023/A:1009746629269>
9. Baumol, W. J. (2004). Entrepreneurial enterprises, large established firms and other components of the free-market growth machine. *Small Business Economics*, 23(1), 9–21. <https://doi.org/10.1023/B:SBEJ.0000026057.47641.a6>
10. Bianchi, C., Isabella, F., & Picasso, S. (2023). Growth slowdowns at middle income levels: Identifying mechanisms of external constraints. *Metroeconomica*, 74(2), 288–305. <https://doi.org/10.1111/meca.12414>
11. Bianchi, C., Isabella, F., Martinis, A., & Picasso, S. (2024). Varieties of middle-income trap: Heterogeneous trajectories and common determinants. *Structural Change and Economic Dynamics*, 71, 320–336. <https://doi.org/10.1016/j.strueco.2024.08.008>
12. Bresser-Pereira, L. C., Araujo, E. C., & Peres, S. C. (2020). An alternative to the middle-income trap. *Structural Change and Economic Dynamics*, 52, 294–312. <https://doi.org/10.1016/j.strueco.2019.10.004>
13. Bulman, D., Eden, M., & Nguyen, H. (2017). Transitioning from low-income growth to high-income growth: Is there a middle-income trap? *Journal of the Asia Pacific Economy*, 22(1), 5–28. <https://doi.org/10.1080/13547860.2016.1261448>
14. Doner, R., & Schneider, B. R. (2019). Technical education in the middle-income trap: Building coalitions for skill formation. *Journal of Development Studies*, 56(4), 680–697. <https://doi.org/10.1080/00220388.2019.1595597>
15. Eichengreen, B., Park, D., & Shin, K. (2012). When fast-growing economies slow down: International evidence and implications for China. *Asian Economic Papers*, 11(1), 42–87. https://doi.org/10.1162/ASEP_a_00118
16. Eichengreen, B., Park, D., & Shin, K. (2013). Growth slowdowns redux: New evidence on the middle-income trap (NBER Working Paper No. w18673). National Bureau of Economic Research. <https://ssrn.com/abstract=2196738>
17. Feki, C., & Mnif, S. (2016). Entrepreneurship, technological innovation, and economic growth: Empirical analysis of panel data. *Journal of the Knowledge Economy*, 7(4), 984–999. <https://doi.org/10.1007/s13132-016-0413-5>
18. Felipe, J., Kumar, U., Abdon, A., & Bacate, M. (2012). Product complexity and economic development. *Structural Change and Economic Dynamics*, 23(1), 36–68. <https://doi.org/10.1016/j.strueco.2011.08.003>
19. Gado, N. D. (2021). Transparency/accountability and human capital development as software in Nigeria's quest for economic development 2004–2020. *Journal of Economics and International Finance*, 13(4), 143–151. <https://doi.org/10.5897/JEIF2021.1118>
20. Gill, I., & Kharas, H. (2007). An East Asian renaissance: Ideas for economic growth. World Bank.
21. Glawe, L., & Wagner, H. (2020). China in the middle-income trap? *China Economic Review*, 60, 101264. <https://doi.org/10.1016/j.chieco.2019.01.003>

22. Glawe, L., & Wagner, H. (2020). The middle-income trap 2.0: The increasing role of human capital in the age of automation and implications for developing Asia. *Asian Economic Papers*, 19(3), 40–58. https://doi.org/10.1162/asep_a_00783
23. Gong, G., Wei, X. Y., Yang, X. M., & Zhao, L. L. (2017). Building a national innovation system with Chinese characteristics to vault over the middle-income trap. *Social Sciences in China*, 8, 61–86+205.
24. Hartmann, D., Bezerra, M., & Pinheiro, F. L. (2019). Identifying smart strategies for economic diversification and inclusive growth in developing economies: The case of Paraguay. *Hohenhm Discussion Papers in Business, Economics and Social ences*. <https://doi.org/10.2139/ssrn.3346790>
25. Hartmann, D., Zagato, L., Gala, P., & Pinheiro, F. L. (2021). Why did some countries catch-up, while others got stuck in the middle? Stages of productive sophistication and smart industrial policies. *Structural Change and Economic Dynamics*, 58, 1–13. <https://doi.org/10.1016/j.strueco.2021.04.007>
26. Hu, X., Wan, G., Yang, C., & Zhang, A. (2023). Inequality and the middle-income trap. *Journal of International Development*, 35(7), 1684–1710. <https://doi.org/10.1002/jid.3747>
27. Kang, N., & Paus, E. (2019). The political economy of the middle income trap: The challenges of advancing innovation capabilities in Latin America, Asia and beyond. *The Journal of Development Studies*, 56(4), 651–656. <https://doi.org/10.1080/00220388.2019.1595601>
28. Koopman, R., Powers, W. M., Wang, Z., & Wei, S.-J. (2010). Give credit where credit is due: Tracing value added in global production chains (NBER Working Paper No. 16426). National Bureau of Economic Research. <https://ssrn.com/abstract=1685731>
29. Lebdioui, A., Lee, K., & Pietrobelli, C. (2021). Local-foreign technology interface, resource-based development, and industrial policy: How Chile and Malaysia are escaping the middle-income trap. *Journal of Technology Transfer*, 46(3), 660–685. <https://doi.org/10.1007/s10961-020-09808-3>
30. Lee, K. (2019). *The art of economic catch-up: Barriers, detours and leapfrogging*. Cambridge University Press.
31. Lee, K., & Ramanayake, S. S. (2018). Adding-up problem and wage–productivity gap in exports of developing countries: A source of the middle-income trap. *European Journal of Development Research*, 30(4), 769–788. <https://doi.org/10.1057/s41287-017-0124-1>
32. Lee, K., Wong, C. Y., Intarakumnerd, P., & Limapornvanich, C. (2019). Is the Fourth Industrial Revolution a window of opportunity for upgrading or reinforcing the middle-income trap? Asian model of development in Southeast Asia. *Journal of Economic Policy Reform*, 23(4), 408–425. <https://doi.org/10.1080/17487870.2019.1565411>
33. Lee, J.-W. (2020). Convergence success and the middle-income trap. *Developing Economies*, 58(1), 30–62. <https://doi.org/10.1111/deve.12214>

34. Michalski, B. (2022). On the bright side of the middle income trap: The Polish case. *Acta Oeconomica*, 72(3), 329–349. <https://doi.org/10.1556/032.2022.00025>
35. Naseemullah, A. (2022). The international political economy of the middle-income trap. *Journal of Development Studies*, 58(10), 2154–2171. <https://doi.org/10.1080/00220388.2022.2096442>
36. Paus, E. (2017). Escaping the middle-income trap: Innovate or perish (ADB Working Paper No. 685). Asian Development Bank Institute. <https://www.adb.org/publications/escaping-middle-income-trap-innovate-or-perish>
37. Paus, E. (2019). Innovation strategies matter: Latin America’s middle-income trap meets China and globalisation. *Journal of Development Studies*, 56(4), 657–679. <https://doi.org/10.1080/00220388.2019.1595600>
38. Paus, E., Abugattas, L., & Cruz Saco, M. A. (2023). Global value chains in agriculture and the middle-income trap: A framework for analysis applied to Peru’s boom. *Journal of Development Studies*, 59(10), 1531–1548. <https://doi.org/10.1080/00220388.2023.2232919>
39. Prajapati, V., Priya, A., & Pradhan, V. (2023). The middle-income trap—A problem of definition and empirical research. *Economic and Regional Studies*, 16(3), 459–472. <https://doi.org/10.2478/ers-2023-0030>
40. Raj-Reichert, G. (2019). Global value chains, contract manufacturers, and the middle-income trap: The electronics industry in Malaysia. *Journal of Development Studies*, 56(4), 698–716. <https://doi.org/10.1080/00220388.2019.1595599>
41. Robertson, P., & Ye, L. (2013). On the existence of a middle income trap. UWA Business School Economics Discussion Papers, 13(12). <http://dx.doi.org/10.2139/ssrn.2227776>
42. Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Harvard University Press.
43. Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65–94.
44. Vu, T. V. (2022). Does institutional quality foster economic complexity? The fundamental drivers of productive capabilities. *Empirical Economics*, 63(3), 1571–1604. <https://doi.org/10.1007/s00181-021-02175-4>
45. Woo, W. T. (2012). China meets the middle-income trap: The large potholes in the road to catching-up. *Journal of Chinese Economic and Business Studies*, 10(4), 313–336. <https://doi.org/10.1080/14765284.2012.724980>
46. Zhang, D. R. (2013). The mechanism of middle-income trap and the potential factors influencing China’s economic growth. *Economic Research Journal*, 48(9), 17–29.

Contact information

Xiaoshan Liu
Huaqiao University
Research Center for Quantitative Economics
Xiamen, China
E-mail: liuxiaoshan126@qq.com

Prof. Xindong Zhao, Ph.D.
Huaqiao University
Research Center for Quantitative Economics
Xiamen, China
E-mail: xzhao@hqu.edu.cn

Prof. Fang Zhao, Ph.D. (Corresponding author)
Jilin University
School of Economics
Changchun, Jilin, China
E-mail: zf18166824443@163.com