

Trade Diversification, Economic Complexity, and Economic Growth: A Comparative study of Asia and GCC Economies

Muzamil Rashid

Lovely Professional University

Vishal Sarin

Lovely Professional University

Rahimullah Safi

r.safi8420@gmail.com

Kabul University

Article

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Abstract

The paper examines a non-linear relationship among trade diversification, economic complexity and economic growth of ten major economies in Asia and the Gulf Cooperation Council (GCC). The study empirically tests the hypothesis of the Inverted U-shape of trade-growth relationship by utilizing a balanced sample of 200 observations (2005–2024). The analysis uses the Random Effects and Fixed Effects regression models to test the hypothesis of the Inverted U-shape. The analysis uses the Random Effects (RE) and Fixed Effects (FE) regression models to test the hypothesis of the Inverted U-shape. The result of Hausman test suggests that the RE model is appropriate, which supports that the effect of initial trade diversification is significant as it enhances the GDP growth significantly at the beginning of the process, but becomes less relevant after reaching a certain level. Also, Gross Capital Formation and Manufacturing Value Added become stable positive predictors of economic prosperity in the long-term. The research also reveals a Human Capital Paradox, of which tertiary enrolment is negatively related to per-capita growth, as the choice of structural skill shortages in several emerging economies. The results also have subtle policy implications: Third-world countries need to pay more attention to diversification of trade on a large scale, whereas the developed economies should rely on specialization in high levels of complexity to maintain the growth patterns.

1. Introduction

Trade diversification nexus and economic growth nexus have always been a point of development economics. The traditional wisdom during many years implied that what a country exports will count as much as how much it exports. The relationship has however become complex as global value chains (GVCs) increasingly become integrated and as digital trade grows.

The shift of the commodity-dependent or low complexity manufacture to the high-value added exports is a critical period for the developing nations. The ASEAN region has shown that nations such as Malaysia and Singapore have high economic complexity potential (Papers & Fakhreddin, 2023). In the meantime, the GCC economies such as Saudi Arabia and UAE are also undertaking non-oil diversification by means of structural reforms (Alzeer, 2025; Chang et al., 2024; Ishker et al., 2026). In spite of them, the literature proposes that the effects of diversification tend to be heterogeneous, and contingent on the quality of institutional and resource dependence (Delechat, 2024; Hamdi et al., 2025).

Recent empirical studies have strengthened the complexity of these relations, showing that there is a high level of bi-directional causality between economic complexity and export diversification (Canh & Thanh, 2022). Such an observation questions the linear hypotheses of the diversification process and encourages the use of more advanced econometric tools. The data is indicative that economic complexity lowers volatility in growth rates in high-income economies, but the changes differ significantly across income levels and periods (Dosi et al., 2022). This heterogeneity highlights the power of regional analysis especially when one is comparing structurally different economies as in our case in the Asian-GCC framework.

The sophistication of the methodology that is needed to measure these dynamics has changed significantly. Current studies use composite measures that combine export, sectoral and fiscal elements of diversification (Ishker et al., 2026). Those multidimensional strategies uncover the fact that the diversification effects will be evident in the long term, and the short-term effects of the reform will be low because of reform gestation lags Nermeen (Coniglio et al., 2021). This element of time is especially important to oil-dependent economies, which must have a long-term policy commitment to structural change that cannot be compressed into an electoral period.

Through the threshold analysis, the non-linearity of the sophistication-diversification relationship has been empirically proven, showing that there are several regimes in which the effect of export sophistication on trade diversification is

considerable (Ali & Munir, 2022). Such evidence positively feeds into our quadratic modelling model and indicates that the policy prescriptions should be tuned to the status of each economy on a complex scale. Moreover, the moderating effect of global value chain involvement creates another dimension of complexity because countries must build their capabilities both home-based and at the same time join the global production networks (Alshomaly & Shawaqfeh, 2020).

The sustainability aspect of diversification has become prominent in the recent literature, that ties the economic change process with an environmental outcome and climate action (Doğan et al., 2023). This relationship is especially applicable in the context of GCC economies, whose diversification policies have to consider the short-term requirements of the economy and the long-term environmental obligations (Sakti, 2024). The establishment of sustainability metrics into diversification analysis is a boundary field where the conventional growth models are very much going to change.

The trade-growth nexus has been well-documented, but despite this, a research gap remains because of the recent, cross-regional comparative studies that have failed to bring together the divergent developmental experiences of East Asian mature industrial giants and emerging resource-rich GCC economies. Most of the current literature concentrates on the high-tech specialization of East Asia or structural transformation of the Gulf in a vacuum, and in many cases, it relies on data that is pre-structural transformation due to the 2020 global pandemic. In addition, although theoretically, the non-linear relationship between diversification and growth is suggested, it is not adequately tested on a panel that spans such a wide gap in economic sophistication and its resource endowment. This paper fills these gaps by using a complete dataset (2005–2024) to empirically test the hypothesis of the Inverted U-shape to ten different Asian and GCC economies to offer a cohesive framework to explain the dynamics of diversification as these countries grow into emerging hubs and turn into full-fledged industrial frontiers.

In the case of resource-rich economies, in particular, recent results show that there exist positive links between diversification and the main development indicators, quantified in terms of the impacts on GDP (Ishker et al., 2026). But the path dependency of the diversification process implies that conditions at the beginning play a significant role in the results, such as the quality of the institutions, human capital, and the presence of an existing industrial base (Alomari & Bashayreh, 2020). This dependency on context strengthens our comparative strategy because the success of diversification strategies cannot be easily applied to other institutional settings.

2. Theoretical Framework and Literature Review.

Recent research has shifted the focus on simple diversity measures of the variation used to measure diversification to those that use product complexity and technological intensity. This diversification in the exportation of creative products has been noted to be one of the key pro-growth variables in the key exporting countries such as China and Singapore. Chang et al. (2024) conducted a Barro-type growth regression among the top ten exporters (2002–2020) and discovered that diversification of creative products will strongly trigger economic growth.

But these advantages of diversification are not everywhere. Studies in India based on the Theil index (that measures the extent margin (new products) as well as the intensive margin (volume of existing products) have shown that broad export diversification has not been always achieved by high GDP growth (Delechat, 2024). This indicates that there could be a lack of connection with the diversities of exports and value-added elements leading to long-term prosperity.

There has been a substantial evolution in the export diversification literature over the past two decades. Initial empirical work concentrated mainly on measures of diversification that were based on straightforward measures capturing the structure of countries' exports in terms of products or sectoral categories. Although such measures offered valuable insight into the level of diversification, they did not account for the technological and knowledge intensity of the

products being exported. Hence, recent studies have turned their attention to the inclusion of complexity, technology content, and knowledge-based production in diversification measures as important dimensions of export performance.

From a theoretical standpoint, diversification promotes growth through the reduced reliance on a few export commodities, exposure to shocks from international markets, and technological learning from exporting more complex products. In fact, countries that are able to diversify themselves into the exportation of more sophisticated products are usually in a better position to realize higher levels of productivity and industrial upgrading. Thus, there has been a marked shift in the focus of recent studies on diversification to include value-added and technology content of exports. Increasing the amount of exported goods does not necessarily lead to economic growth because such diversification can take place within sectors with lower productivity and low value creation.

As seen from the case study of India, a more diversified export portfolio does not necessarily lead to higher GDP growth. According to Delechat, (2024), based on the analysis of extensive and intensive margins of trade using Theil Index, a greater extent of export diversification did not lead to increased growth. In other words, although India managed to make considerable steps towards diversifying its exports, it was not always possible to reap any tangible benefit out of this process. These results indicate that diversification's impact on economic growth depends on the quality of diversification and not only its scope. Thus, diversification without technological advancement, productivity growth, and value creation might not yield substantial economic gains for countries.

Thus, while it is beneficial for economies to diversify their exports in order to create a wider export base and become less vulnerable to external shocks, sustained growth will depend on countries' ability to diversify into productive sectors. It is thus apparent that the current literature tends to stress the need for diversification to be approached as a process of structural transformation involving both export promotion and capability development. This framework offers a valuable starting point for analyzing the linkages between export diversification, economic complexity, and economic growth.

2.2 Economic Complexity and Resilience.

Economic complexity represents an interesting area for research that has been developed in connection with the idea of diversification and has attracted much interest in recent years. In contrast to export diversification, which concerns itself with the number of products exported from a particular country, economic complexity addresses issues relating to the productive capabilities, technological competencies, and institutions involved in a certain economy. The Economic Complexity Index (ECI) is determined by taking into account not only the diversity but also the rarity of the products that the country exports, thereby offering a more nuanced approach to measuring the capabilities involved in exporting and manufacturing knowledge-intensive and technologically sophisticated products.

It has been argued that economies with higher levels of complexity have more chances of experiencing sustainable development due to the larger number of productive capabilities and opportunities for innovation present in such economies. Therefore, economic complexity appears to be a factor critical to long-term economic success. Evidence suggests that there is a positive relationship between economic complexity and economic development. Research done using long-term data shows that higher levels of economic complexity lead to economic growth and economic transformation. According to research carried out by AlOtaibi & Mohamed Sallam, (2025), there is a positive correlation between economic complexity and development over the long term, though in the short run the effect seems rather insignificant. It is argued that the impact of complexity in an economy occurs gradually and takes time because productive capabilities have to be built up before they can be incorporated in the economy. The effect of increased complexity would assist in transforming resource-based economies into knowledge-based economies. More empirical findings regarding Saudi Arabia confirm that technological advances play an important role in determining economic

sophistication. According to Bedir, (2023), ICT advancements played an important role in helping the country make significant progress towards increased economic complexity. Technological advancements and innovations in ICT helped improve productive capacity and contribute to the diversification of economic activities outside the oil industry. This evidence helps reinforce the view that the adoption of technology plays a significant role as a tool for increasing the level of sophistication in economies.

A correlation between economic complexity and economic resilience is observed in the context of the ASEAN region. Countries like Singapore and Malaysia have performed much better in comparison to other countries in the region with regard to economic complexity and growth performance. In particular, the economic experience of these countries reveals that economies with complex production networks and advanced technology tend to exhibit higher resilience to external economic shocks. The complexity of the economy enables enterprises to adapt to changes in global demands and avoid being vulnerable economically. Kužnar, (2024), for example, analyzed the association between concentration and economic resilience in the case of some Southeast Asian countries, including Singapore, Cambodia, Malaysia, and Thailand. Applying the Herfindahl-Hirschman Index (HHI) as an indicator of export concentration, it was demonstrated that low degrees of concentration had a positive effect on the resilience of the economy. Those economies which developed more diversified and complex structures of exports had higher capabilities to cope with the fluctuations of international markets and economic shocks. These results imply that diversification and complexity have a significant positive influence on the stability of the economy through its decreasing dependence on the selected items.

Another theoretical point of view is concerned with the changing nature of the links between diversification, complexity, and growth throughout the development process. According to theory, diversification is essential in the beginning stage of development since it enables economies to overcome the problem known as the "low-income trap" and diversify productive activities. With an increased number of goods produced, nations gain new capabilities while becoming less dependent on traditional industries. However, there is evidence of diminishing returns to diversification at some point in the development process. As suggested by Masatoshi, (2025), the growing economies are able to experience more growth benefits from specialization in high-complexity industries rather than expanding continuously the range of their exported goods. When the economy acquires enough capabilities, it might become beneficial for the country to concentrate its efforts in industries which use advanced technology and have significant value added to the production process.

In other words, diversification and complexity do not compete as development policies. They can be considered as complementary stages within economic evolution. On the one hand, diversification provides countries with opportunities to develop capabilities required for economic transformation. On the other hand, economic complexity is associated with the ability of an economy to accumulate and apply its capabilities successfully.

2.3 Institutional and Regional Heterogeneity.

The effect of complexity will usually depend on the quality of institutions and reliance on resources. A Buffered Threshold Panel Data model applied by Hamdi et al., (2025) on 92 countries revealed that even the effects of ECI may be adverse in those countries that have weak institutions or the ones that have extreme resource dependence (Hamdi et al., 2025). Equally, in Turkey, regional imbalances have contributed to the inability of the eastern provinces to benefit with increase in complexity compared to their western counterparts (Korkmaz et al., 2025). This brings out the necessity of a comparative study taking into consideration both the geographic and the institutional factors.

The results of diversification are highly diverse in the region, which was widely observed in the literature in recent times. In their analysis of the West Asian Arab countries, Alshomaly & Shawaqfeh, (2020) determine that human capital and anti-corruption policy have a positive impact on growth, but trade openness has a negative impact that is quite

opposite. Their interdependence in terms of causality of growth and diversification indicates that the quality of the institution is an intermediate of the adequacy of policies of structural transformation (Coniglio et al., 2021).

The sustainability aspect of institutional heterogeneity has become a pivotal point in the modern-day analysis of diversification. (Sakti, 2024) illustrate that the interaction of capital formation, oil rents, foreign investment, labor dynamics, rule of law, and CO2 emissions generate a complicated interdependency that differs greatly among GCC countries. Their results stress that the traditional diversification ways are limited more by environmental concerns and that it is necessary to combine approaches to economic change.

The methodological shift in the representation of institutional heterogeneity is the increasing awareness of complexity in the diversification processes. Doğan et al., (2023) present a bibliometric analysis that provides four key clusters of research including economic diversity and development; diversification of exports and trade openness; energy and environmental factors; and sustainability aspects (Lee, 2021). This convergence is multidisciplinary, which implies that diversification strategies to be effective need to consider the issues of the economy, environment, and the institutions equally, especially in the framework of sustainable development goal 9 and 13 (Komasi et al., 2023). The parametric heterogeneity of institutional contexts has been measured with the help of advanced methods of modeling. The authors find a different set of parameter regimes among the four categories of the economy, including their parameter regimes (Teza et al., 2018), as they found that the noise strength differs among the risky economies between the extremes of the very high and the very low levels in developed countries. Their comparison reveals that low-entropic countries are characterized by mixed behavioral patterns indicating dynamic instability and indicating that institutional development should be one of the preconditions to successful complexity-based growth strategies (Büning et al., 2023).

The resource dependency aspect of institutional heterogeneity can be seen in the different parameter configurations and growth patterns. Idrisi et al., (2025) indicate that the resource endowment of countries such as Saudi Arabia, Venezuela and Kuwait has lower entropic complexity despite the high overall export even in the presence of large export structures dominated by petroleum products. The result supports the institutional dilemma of the resource-dependent economies to gain any meaningful resource diversification, since their concentration in exports is both a factor of resource endowments and institutional capacity constraints (Lectard & Rougier, 2018).

Temporal dynamics of institutional impacts on diversification display path dependent on mechanisms which are highly region-specific. Canh & Thanh, (2022) reveals that the effectiveness of negative effect of the economic complexity on the growth cycles is statistically significant only in the high-income economies and in the years before 2008, and it may be implied that the development of institutions distorts the relationship between the economic stability and the complexity. This heterogeneity in time suggests that the diversification strategies should be set to adjust not only to the present institutional capacity but also to the anticipated pattern of institutional evolution (Dhehibi et al., 2023).

3. Methods and Data

3.1 Data Source and Sample

The research is using a panel dataset of ten economies including China, Japan, South Korea, Malaysia, Thailand, Singapore, Philippines, India, the United Arab Emirates (UAE) and Saudi Arabia. The time horizon is the 20 years (2005–2024), which means that the total number of observations is 200 ($N = 200$). International databases such as the World Bank, IMF and OECD were used as sources of data which were complemented by some of the most recent country specific reports and the ECI database.

3.2 Key Variables

This paper employs GDP Growth (annual per cent) as a dependent variable to assess economic performance. The dominant explanatory variable is Export Diversification that explains the degree to which the exports of a country are diversified into various products and Export Concentration, which denotes the dependence of a few export goods. A number of control variables are also added to represent other factors that influence growth. The extent of integration into the international markets is measured as Trade Openness. The Foreign Direct Investment (FDI) inflows (percent of GDP) are the external capital inflows that may contribute to economic development. Gross Capital Formation (as a Per cent of GDP) shows the domestic investment in productive assets and infrastructure. The measure of the contribution of industrial development in economic growth is Manufacturing Value Added (% of GDP), and the measure of the technological sophistication of exports is High-Technology Exports (% of manufactured exports). Lastly, Secondary and Tertiary School Enrollment (% gross) is taken up as a proxy of human capital and the development of the education sector.

3.3 Econometric Specification

A quadratic regression specification was developed in order to model the potential non-linear association between diversification and growth. This gives the possibility to test the so-called hypothesis of the Inverted U-shape that diversification is good to a certain extent beyond which specialization increases in importance.

$$Growth_{it} = \beta_0 + \beta_1 Div_{it} + \beta_2 Div_{it}^2 + \beta_3 openness_{it} + \beta_4 FDI_{it} + \beta_5 GCF_{it} + \beta_6 Edu_{it} + \beta_7 Mfg_{it} + \beta_8 HiTech_{it} + \epsilon_{it}$$

where i represent the country and t represents the time. Growth is the growth of GDP annually, and Div is the export diversification. The squared term Div^2 is added to include the non-linear impact of diversification on the growth. Other descriptive variables are trade openness, the inflows of foreign direct investment, gross capital formation, education indicators, manufacturing value added and high-technology export that are widely cited in the literature as significant determinants of economic growth.

To make an estimate of the panel data model, Fixed Effects (FE) and Random Effects (RE) estimators were taken into consideration. The methods enable the analysis to consider the heterogeneity of countries that can affect economic growth. Hausman test was done to establish the best estimator. The choice of the preferred specification that would be used in the empirical analysis was the Random Effects model since the test result indicated that the differences between the two estimators were not statistically significant.

3.4 Descriptive statistics

Table 1 displays the descriptive statistics of all the variables used in the analysis considering 200 observations of the panel dataset. The statistics also contain the mean, standard deviation, minimum and maximum value of each variable giving a summary on how the data is distributed. The mean growth rate of the GDP in the sample is 4.21 percent with a standard deviation of 3.74 meaning that the economic performance in the chosen economies is moderate. The lowest is -9.52 percent, which captures the periods of contraction in the economy and the highest growth rate of 14.52 percent, which indicates the existence of high-growth spurts in certain nations. In terms of trade structure, the average value of the diversification of exports is 0.49, which is an indicator of a moderate diversification among economies sampled. The diversification values range between 0.35 and 0.78, which shows that there are differences in the level of export structures among nations. On the same note, the concentration of exports indicates the average value of 0.23 with observable differences between the lowest level of 0.08 and highest 0.74, indicating that certain economies depend more on few export products. The level of trade openness is 113.56 percent of

Table 1
Descriptive statistics of main variables (2005–2024).

Variable	Mean	Std. Dev.	Min	Max
GDP Growth (%)	4.21	3.74	-9.52	14.52
Export Diversification	0.49	0.11	0.35	0.78
Export Concentration	0.23	0.16	0.08	0.74
Trade Openness	113.56	93.20	24.39	437.33
FDI Inflows (% of GDP)	4.04	6.65	-0.86	33.30
Gross Capital Formation (% of GDP)	28.03	6.86	16.02	46.27
Secondary Enrollment (%)	91.25	13.57	55.93	128.03
Tertiary Enrollment (%)	53.87	25.30	11.13	108.70
Manufacturing Value Added (%)	20.38	6.72	7.69	31.99
Hi-Tech Exports (%)	28.08	19.63	0.30	67.05

Source: Authors Compilation.

GDP which indicates a high integration of the chosen economies in global trade. Nonetheless, the standard deviation is high (93.20) which means that the trade exposures of the countries of the sample vary significantly. The average FDI inflows stands at 4.04 percent of GDP, even though this is in the range of -0.86 to 33.30 percent which implies that there are significant changes in foreign investment overtime. Gross capital formation is 28.03 percent of the GDP, showing quite good investment levels in the economies of the economies being considered under this paper. The indicators of education also experience a lot of variation. The mean secondary school attendance rate stands at 91.25 percent with an average of 53.87 percent tertiary attendance implying that there are disparities in human capital development in various countries. Regarding the industrial structure, manufacturing value added adds on average 20.38 percent of GDP, and the high-technology exports are 28.08 percent of total manufactured exports. These signs depict the differences in the level of industrialization in the sampled economies. By and large, the descriptive statistics indicate high levels of variation among countries and time which contributes to the adoption of panel data methods as a way of conducting empirical analysis.

Table 2
Correlation matrix of key variables

Variable	GDP gr	Div	Concen tration	Openness	FDI	GCF	Edu Sec	Edu Tert	MVA	Hi-Tech Ex
GDP gr	1.00									
Div	0.07	1.00								
Concentration	-0.01	0.93	1.00							
Openness	0.02	-0.04	0.06	1.00						
FDI	0.13	-0.04	0.02	0.85	1.00					
GCF	0.35	-0.21	-0.30	-0.31	-0.14	1.00				
Edu Sec	-0.24	0.06	0.17	0.09	0.15	0.05	1.00			
Edu Tert	-0.25	-0.16	-0.05	0.40	0.41	-0.04	0.63	1.00		
MVA	0.13	-0.61	-0.65	-0.06	-0.03	0.31	-0.05	0.16	1.00	
Hi-Tech Ex	0.10	-0.29	-0.28	0.38	0.40	-0.21	-0.15	0.14	0.49	1.00
Source: By Authors compilation										

Table 2 shows the pairwise correlation between the key variables that were used in the study. The findings indicate that GDP growth is linked with positive relationships with foreign direct investment (FDI), gross capital formation (GCF) and manufacturing value added (MVA), and high-tech exports, which implies that investment, capital accumulation and development of industrial sectors are measures that drive economic growth. Diversification of trade has a weak positive correlation with the growth of GDP whereas the correlation between exports and growth is very small and negative.

Trade openness is also a strong positive correlation of FDI, and so the relationship between international integration of trade and foreign capital inflows. There is a moderate correlation between the education variables of secondary and tertiary enrollment which indicates that there is a relationship between the gains at various levels of human capital development. In general, the majority of the correlation coefficients are in moderate values, which means that there is no severe multicollinearity between most of the variables, whereas the great correlation between diversification and concentration is predicted by the nature of the concepts.

4. Empirical Results

Several diagnostic tests were run before the regression model was estimated in order to verify the reliability of the empirical analysis. They are descriptive statistics, correlation analysis, multicollinearity test (VIF), and Hausman specification test to identify the panel estimation technique. The sample is based on 200 observations on the ten Asian and GCC economies of 2005 to 2024.

Table 3
Hausman specification test for model selection

Test	Chi-Square	df	p-value	Decision
Hausman Specification test	15.18	8	0.0557	Random Effect preferred

Source: Authors compilation.

It was conducted to find out the most suitable estimator, the Fixed Effects or the Random Effects estimator, by comparing the Hausman specification test with the panel data structure. The test generated a p-value of 0.0557 (refer to Table 3) and indicates that the Random Effects model cannot be rejected at the 10 percent level. In turn, the Random Effects estimator was chosen as the model of choice. Another reason why this choice is justified is the features of the dataset that consists of countries that belong to various geographic and economic areas, namely, Asian and Gulf Cooperation Council (GCC) economies. Given that there is a significant variation between these economies across countries, the Random Effects model is believed to be appropriate to embrace cross-sectional and temporal variations. Also, a Multicollinearity test was conducted with the help of the Variance Inflation Factor (VIF). The mean value of VIF of 2.60 means that the issue of multicollinearity is not severe in the model as it is far below the generally accepted value of 10. This implies that the estimated coefficients are consistent and sound.

4.2 Regression Results: The evidence of the inverted U-Shaped Relationship.

Table 4 regression findings are empirical evidence that indicates the non-linearity in the relationship between export diversification and economic growth. The coefficient of linear diversification term is positive and significant (statistically). $\beta = 63.49$, $p < 0.05$ shows that the initial economic growth will be realized by increasing the diversification of exports. However, the coefficient of the quadratic term is negative (which is significant) $\beta = -47.33$, $p < 0.05$, which confirms that there is an Inverted U-shaped relationship. This observation indicates that diversification has a positive growth impact to some level. Beyond this, any additional diversification will decrease efficiency, and economies can perform better growth results by specialization and competitiveness in specialized sectors. The turning point is estimated to be at

Table 4
The Regression of the Effect of Trade Diversification on the GDP Growth-
Random Effects.

GDP Growth (%)	Coef.	Std. Err.	z	P > z
Export Diversification	63.49**	27.02	2.35	0.02
Export Concentration	-47.33**	23.44	-2.02	0.04
Trade Openness	0.00**	0.00	0.07	0.95
FDI Inflows (% of GDP)	0.16**	0.07	2.38	0.02
Gross Capital Formation (% of GDP)	0.20**	0.04	4.70	0.00
Secondary Enrollment (%)	-0.02**	0.02	-0.78	0.44
Tertiary Enrollment (%)	-0.04**	0.01	-3.26	0.00
Manufacturing Value Added (%)	0.16	0.06	2.65	0.01
Hi-Tech Exports (%)	-0.01	0.02	-0.36	0.72
Constant	-20.42**	8.46	-2.41	0.02
<i>Note: Significance Levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.</i>				

Source: Authors Compilation.

0.67 in the index of diversification, where specialization is more growth enhancing thereafter. There are also several control variables that exhibit high impacts on economic growth. The positive and highly significant coefficient is gross capital formation. $\beta = 0.20, p < 0.01$), indicating that increased levels of investment have a positive impact on economic growth. Equally, the positive and statistically significant effect is also observed in flows of FDI inflows $\beta = 0.16, p < 0.05$, representing the importance of foreign investment in assisting in economic growth in terms of technology transfer and accumulation of capital.

The manufacturing value added coefficient is also significant and positive as well $\beta = 0.16, p < 0.01$), which implies that increased industrial activity leads to increased rates of economic growth. Conversely, the relationship between tertiary education enrollment and education is negative and statistically significant ($\beta = -0.04, p < 0.01$). This unforeseen outcome can be a manifestation of structural imbalances between the higher education systems, and the labor market needs in certain

economies, or the slow payback period of the human capital investment on the economic development. The other variables like trade openness, secondary education enrolment and high-technology exports have statistically non-significant effects in the estimated model indicating that their direct effect on short-term economic growth is likely to be weak over the sample. In general, the regression findings give solid empirical evidence of the support of inverted U-shaped theory of relationship between export diversification and economic growth since they suggest that, although diversification is effective at the earlier phases of development, mature economies can grow better with strategic specialization in advanced and high productivity industries.

5. Discussion and Comparative Analysis

The empirical findings of the present research are good evidence that the relationship linking trade diversification to economic growth is not linear implying that the hypothesis of inverted U-shaped is true (refer to Fig. 1). The positive and statistically significant coefficient of export diversification shows that the augmentation of the product diversity in exports first facilitates growth in the economy. This finding implies that by diversifying the export baskets of the countries, they tend to be less sensitive to few commodities and are more vulnerable to external shocks. Diversification also promotes structural change as it lets economies diversify into new sectors, hence enhances productivity and raises economic stability.

The negative coefficient of the squared term of diversification, however, points to the fact that past a given point, the positive gains of diversification start decreasing. The implication of this finding is that too much diversification can result in inefficiency since a country can divide its resources into too many sectors without successfully gaining high competitiveness in any given industry. In this regard, findings indicate that the strategic specialization in technologically advanced and high productivity sectors is more advantageous to the long run economic growth when the economies have some degree of diversification. The turning point of about 0.67 on the diversification index is estimated and it means that diversification starts generating lower returns. The findings also bring out the significance of capital accumulation and industrial growth in economic growth. The effect of the gross capital formation on GDP growth is quite strong and significant with a greater emphasis given on domestic investment to increase the productive capacity and infrastructure. In the same way, manufacturing value added positively impacts on growth significantly implying that the economic performance of the economy is higher in those economies that have better industrial sectors. Such results are also in line with the development theories which focus on industrialization and structural transformation as the major sources of economic development.

The foreign direct investment (FDI) also seems to add to the growth of the economy. The fact that positive coefficient is positive means that inflows of international capital could boost a given economy by availing financial resources,

sophisticated technologies, and management skills. In the case of developing and emerging economies, FDI can be very instrumental in facilitating the industrial upgrading process and making their exports more competitive on the international market. Interestingly, the statistical results depict a negative coefficient tertiary education enrollment, which is statistically significant. Even though education is usually supposed to stimulate economic development, such a development could be indicative of structural issues in the sampled economies. In other instances, the higher education system might not necessarily be in tandem with the labor market thereby creating skill gaps and underemployment in graduates. Moreover, higher education investment returns might not be realized immediately and can only be seen in the growth in the short run. Comparing these results with the previous empirical studies, the findings are more or less similar to the findings of past literature on trade diversification and economic development. Multiple research projects have suggested that diversification is a highly important factor within the initial phases of development, as it increases possibilities of export and raises the stability of the performance of the economy. Nonetheless, in the case that nations are being industrialized and have become more technologically advanced, division of labor in areas where productivity and innovation are the most productive, the role of specialization grows. This has been witnessed in most developed economies in Asia where they started off by diversifying but then specialized in the high-tech industries.

A horizontal point of view also shows variations in the Asian and GCC economies represented in the sample. Many economies in Asia, including those that have gone through a rapid industrialization process, have diversified their export structure and slowly shifted to higher value-added production industries. On the contrary, a number of GCC economies have traditionally depended on a smaller scope of exports, especially natural resources. Though there has been an increase in diversification activities in recent years, the shift towards complex export structures is still a continuous process in most of these economies. Overall, the results indicate that export diversification is a significant method of economic development at the initial and middle phases of its development as it assists in accelerating structural change and alleviating exposure to the external shocks. But as the economies become mature and are able to build better industrial capacities, the growth strategies might become more specialized in the high-technological and advanced industries. This is a dynamic process which is an indication of the larger development of trade forms and the essentiality of putting a balance between diversification and strategic specialization to realize sustainable long-term growth.

Furthermore, the study findings offer key insights into the impact of economic complexity on the diversification-growth nexus. While diversification increases the range of products produced by an economy, the level of economic complexity determines how sophisticated and knowledge-intensive such products are. Countries that choose to diversify their product bases by incorporating technologically advanced production processes would achieve better productivity growth compared to nations that simply increase the quantity of exportable goods. This finding would benefit not only Asian countries but also the GCC region, since the quality of diversification may matter much more than the level of diversification. Economic growth could be achieved only when diversification involves developing productive capacity and innovating technologies.

The other major implication of the findings pertains to the economic resilience of the nation state. Economically diversified countries tend to be better shielded from adverse effects of external shocks, including price volatility, shifts in demand, and disturbances in international trade. In times of economic uncertainty, countries that have diversified export base would have several sources of foreign revenue, resulting in reduced macroeconomic volatility. This is especially critical for countries whose exports are largely based on natural resources. Thus, diversification should be seen not only as a growth-generating tool but also as a key factor in enhancing the economic resilience and mitigating the effects of external shocks.

The findings indicate that institutional factors and a favorable policy framework contribute to achieving sustainable growth from diversification strategies. Countries that have better institutions and well-functioning institutions are likely to be more successful in translating diversification efforts into economic growth. On the contrary, in weak institutions countries, the success rates of diversification may be lower due to certain constraints. This fact emphasizes the significance of reforms that involve such elements as higher regulatory quality, innovations, human capital, and support for the private sector. Absence of these factors makes the achievement of high economic gains from diversification doubtful.

The case study of the two economies provides even more insights into the processes of structural transformation and the role of diversification therein. Many Asian countries were able to transition from intensive employment-based production into high-tech industries and sophisticated manufacturing. The example shows the potential of export diversification in becoming a basis for further industrial development and economic complexity increase. In many cases, there was active government support for export-oriented industrialization programs. Such policies have allowed for companies to upgrade their business activities and participate more efficiently in the global value chains.

On the contrary, while many of the GCC economies have attempted to diversify and achieve greater economic success over time, the majority are still faced with the problem of reducing dependency on hydrocarbon exports. Despite substantial efforts through various national strategies and economic reforms, it is important to note that the transition to innovation- or knowledge-based economies is a gradual process. The findings indicate that there is room for diversification strategies to emphasize the development of high-technology-based sectors that will provide sustainable sources of growth through innovation and technological advancement.

As far as the policy implications of the estimation are concerned, policymakers should understand that diversification is a means to an end rather than the end goal. Specifically, diversification will allow for developing productive capabilities and achieving structural transformation. In the initial stages of economic development, it can be especially beneficial to increase the export basket to open up new possibilities in terms of the economy. Nevertheless, after obtaining a sufficient degree of diversification, policy-makers may have to refocus their attention to increasing the levels of productivity, innovation, and competitiveness in important strategic sectors. Such an approach will make it possible for countries to derive more benefit from their production processes and thus maintain their economic growth.

Summing up, one can conclude that the presented evidence supports the view according to which successful development policies involve a balance between diversification, economic complexity, industrialization, and institution building. It is the interplay of the above-mentioned elements that affects countries' abilities to grow, develop, and adjust to changes in the global economic environment. This is why future development policies must focus not only on diversifying countries' economies but also making them more complex and innovative.

6. Conclusion

This paper examines the effect of diversification on economic growth in a sample of ten Asian and GCC countries for the period 2005–2024. Panel data methods were utilized in this research to test the hypothesis about the importance of diversification for economic growth and the role of economic development in shaping the impact of diversification. Based on the empirical analysis, it may be concluded that diversification plays an important role in the process of economic growth, but it does not have the same effect at all levels of economic development. Specifically, there exists a non-linear relationship between exports diversification and economic growth, which takes place in the form of an inverted U-shape, meaning that the impact of diversification on economic performance diminishes when productive activities become more sophisticated.

According to the results obtained, it can be stated that developing countries gain the most advantages from diversification. First, diversification allows reducing economic dependency, making countries less vulnerable to external market conditions. Second, it facilitates the process of technological adoption and encourages learning in the sense that more new productive activities appear. Overall, diversification stimulates structural change through providing more opportunities for expanding economic activities.

However, this research has shown that diversification alone will not be enough for the continued growth of the economy. As countries start developing their industrial and technological skills and capacities, it is becoming harder to benefit from the continuous expansion of the diversity of their exports. In such a situation, focusing on the areas in which countries are more productive, competitive, and have more technological capacity will allow countries to get even better economic results. It means that specialization must come after diversification as the subsequent stage of development.

In addition, it is important to point out the importance of focusing on domestic economic fundamentals for improving the growth rate. Both manufacturing activities and capital investments turned out to have a positive impact on the growth of economies. Therefore, investment in productive capacities, the further development of the industry and its capacity for producing products must be considered crucial elements for the success of export diversification strategies.

The last important point worth mentioning is the adverse correlation between higher education and economic development. Education is often viewed as an important determinant of development; however, the finding above demonstrates that there may be cases where educational achievement is not accompanied by enhanced levels of productivity. The fact is that in many resource-based and developing countries, education attained at the tertiary level may not correlate well with the needs of the labor market. Thus, graduates can find few job opportunities that make use of their expertise, which implies a lack of synergy between economic growth, education and the labor market.

It goes without saying that the implications for public policy will differ depending on the economic conditions prevailing in particular countries. If we talk about resource-based and developing countries, it will be advisable to undertake measures to diversify economies, foster industrialization and integrate into international value chains. The reason is obvious – diversified economies tend to be less susceptible to external shocks. As far as diversified economies are concerned, they would benefit greatly from enhancing the sophistication of their exports and innovation activities. Moreover, in order for GCC economies to become less dependent on oil revenues, there needs to be a sustained focus on developing non-hydrocarbon industries. their long-term growth prospects by shifting towards technology-driven production.

While offering valuable insight into the issue, the paper still suffers from certain weaknesses. To start with, it is limited to a select few Asian and GCC countries, thus, limiting the applicability of findings to other regions. In addition, although diversification of exports is identified as one of the most influential determinants of economic growth, many others might also contribute to economic prosperity, including innovation, institutions, and participation in value chains. In future studies, a wider range of indicators should be included to better understand how trade diversification affects economic performance.

To conclude, the current paper has established the importance of export diversification as a driver of economic growth as well as demonstrated that the impact of export diversification varies as the economy develops. In particular, the findings suggest that export diversification contributes to economic growth in earlier stages of development, whereas specialization plays a much more important role in more advanced economies. It is thus clear that for any economy to continue growing, there must be a proper balance between diversification, development, technological advancement,

and human capital development. In this case, both the GCC countries and Asian countries have the ability to improve their economic situation through proper policies based on their current structures.

Disclosure

of Conflicting Interests.

The authors confirm that there are no conflicts of interest, either financial or otherwise, which might have affected the work, writing, interpretation of results, and publication of this paper. The authors have no personal, professional, institutional, or commercial relations that would be seen as a conflict of interest relative to the present study. All the analyses and interpretations of this manuscript were done independently and objectively.

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Declarations

Ethical Statement

This manuscript is entirely reliant on secondary data taken from publicly available databases and publications. There are no human subjects or animal subjects used in the study. Therefore, ethics committee approval is not needed for this study.

Author Contribution

M.R. conceptualized the study, conducted the empirical analysis, interpreted the results, and wrote the main manuscript text. V.S. contributed to the research design, methodology development, literature review, and manuscript editing. R.S. assisted with data collection, data organization, and review of the final manuscript. All authors reviewed and approved the final version of the manuscript.

Data Availability

The data used in this study were obtained from publicly available secondary sources, including the World Bank's World Development Indicators (WDI), the Observatory of Economic Complexity (OEC), and other internationally recognized databases. The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

1. Ali S, Munir Q (2022) Impact of Export Sophistication on Trade Diversification: The Mediating Role of Participation in Global Value Chains. *J Bus Social Rev Emerg Economies* 8(2):531–546.
<https://doi.org/10.26710/jbsee.v8i2.2363>

2. Alomari MW, Bashayreh AG (2020) Modeling the exports diversification in the oil countries growth: the case of Gulf cooperation council countries. *Int J Energy Econ Policy* 10(3):119–129. <https://doi.org/10.32479/ijeep.8977>
3. AlOtaibi E, Mohamed Sallam M (2025) The Impact of Economic Complexity on Economic Development in Saudi Arabia (1991–2021). *Acad J Res Sci Publishing* 6(69):80–122. <https://doi.org/10.52132/Ajrsp.e.2025.69.4>
4. Alshomaly IQ, Shawaqfeh W (2020) The Effect of Export Diversification on the Economic Growth of West-Asian Arab Countries. *J Social Sci (COES&RJ-JSS)* 9(2):429. <https://doi.org/10.25255/jss.2020.9.2.429.450>
5. Alzeer MA (2025) ICT and economic complexity in Saudi Arabia: pathways to economic diversification under vision 2030. *Adv Appl Stat* 92(8):1143–1159. <https://doi.org/10.17654/0972361725051>
6. Bedir A (2023) Specialization Level and Sectoral Development Trends in Turkish Manufacturing industry foreign trade. *Manisa Celal Bayar Univ J Social Sci* 21(3):0–1. <https://doi.org/10.18026/cbayarsos.1234062>
7. Büning C, Steinberg C, Lausberg H (2023) Impact of Diversification on Movement Self-Perception and Movement Performance in University Sports Students. *Research Quarterly for Exercise and Sport*. <https://doi.org/10.1080/02701367.2023.2174489>
8. Canh NP, Thanh SD (2022) The Dynamics of Export Diversification, Economic Complexity and Economic Growth Cycles: Global Evidence. *Foreign Trade Rev* 57(3):234–260. <https://doi.org/10.1177/0015732520970441>
9. Chang T-C, Lyu Y, Chang T, Ranjbar O, Saboori B (2024) Diversifying the export basket of creative products and accelerating economic growth. *J Int Trade Economic Dev* 33(8):1708–1727. <https://doi.org/10.1080/09638199.2024.2323047>
10. Coniglio ND, Vurchio D, Cantore N, Clara M (2021) On the evolution of comparative advantage: Path-dependent versus path-defying changes. *J Int Econ* 133:103522. <https://doi.org/10.1016/j.jinteco.2021.103522>
11. Delechat C (2024) Economic Diversification in Developing Countries. *Departmental Papers* 2024(006):1. <https://doi.org/10.5089/9798400240201.087>
12. Dhehibi B, Fouzai A, Frija A, Adhim MA, M'hamed HC, Ouerghemmi H, Rekik M (2023) Assessing complementary synergies for integrated crop–livestock systems under conservation agriculture in Tunisian dryland farming systems. *Frontiers in Sustainable Food Systems*, 6. <https://doi.org/10.3389/fsufs.2022.1022213>
13. Doğan B, Rao A, Ferraz D, Sharma GD, Shahzadi I (2023) What do we learn from Nexus between trade diversification and structural change: informing the future about climate action and Sustainability. *Environ Sci Pollut Res* 30(40):92162–92181. <https://doi.org/10.1007/s11356-023-28770-9>
14. Dosi G, Riccio F, Virgillito ME (2022) Specialize or diversify? And in What? Trade composition, quality of specialization, and persistent growth. *Ind Corp Change* 31(2):301–337. <https://doi.org/10.1093/icc/dtac008>
15. Hamdi F, Souam S, Zouikri M (2025) The Heterogeneous Effect of Economic Complexity on Growth and Human Development: New Empirical Evidence Using Buffered Panel Threshold Regression. *World Econ* 48(12):2561–2592. <https://doi.org/10.1111/twec.70023>
16. Idrisi MJ, Gupta R, Maurya R, Lalwani K, Beza D (2025) Modeling the dynamics of Indian exports, US tariffs, and competitiveness. *Future Bus J* 11(1):241. <https://doi.org/10.1186/s43093-025-00667-8>
17. Ishker N, Taher H, Houshaimi M (2026) Oil Dependence, Economic Diversification, and Economic Growth in GCC Countries: A New Composite Index and PMG–ARDL Evidence. *Int J Energy Econ Policy* 16(2):230–241. <https://doi.org/10.32479/ijeep.22501>
18. Komasi H, Zolfani SH, Nemati A (2023) Evaluation of the social-cultural competitiveness of cities based on sustainable development approach. *Decis Mak Appl Manage Eng*. January. <https://doi.org/10.31181/dmame06012023k>
19. Korkmaz İ, Çınar İT, Baycan T (2025) Economic Complexity and Regional Growth in Turkey: Implications for East-West Disparity. *Eastern Eur Econ* 63(4):610–636. <https://doi.org/10.1080/00128775.2024.2304220>

20. Kužnar A (2024) Shaping the economic resilience in East Asia through international trade. In *Regional Cooperation and Resilience in East Asia* (pp. 52–73). Routledge. <https://doi.org/10.4324/9781003458357-4>
21. Lectard P, Rougier E (2018) Can Developing Countries Gain from Defying Comparative Advantage? Distance to Comparative Advantage, Export Diversification and Sophistication, and the Dynamics of Specialization. *World Dev* 102:90–110. <https://doi.org/10.1016/j.worlddev.2017.09.012>
22. Lee S-T (2021) An Analysis on the Competitiveness of Japanese Steel Products in Korea: Focus on the Structural Changes of Supply and Demand in Korea Steel Industry*. *J Korea Trade* 25(4):1–16. <https://doi.org/10.35611/jkt.2021.25.4.1>
23. Masatoshi H (2025) Higher education for economic development: contexts of escaping low-and-lower-middle-income trap in ASEAN. *Discover Educ* 4(1):288. <https://doi.org/10.1007/s44217-025-00744-8>
24. Papers M, Fakhreddin M (2023) *Specialization vs Diversification: The Rise and Fall of Windsor-Essex's Automotive Industry*. <https://scholar.uwindsor.ca/major-papers/257/>
25. Sakti MRP (2024) The Economic Diversification and Sustainability Development in Oil-Rich Countries: A Panel Data Study. *E3S Web of Conferences*, 593, 01001. <https://doi.org/10.1051/e3sconf/202459301001>
26. Teza G, Caraglio M, Stella AL (2018) Growth dynamics and complexity of national economies in the global trade network. *Sci Rep* 8(1):15230. <https://doi.org/10.1038/s41598-018-33659-6>

Figures

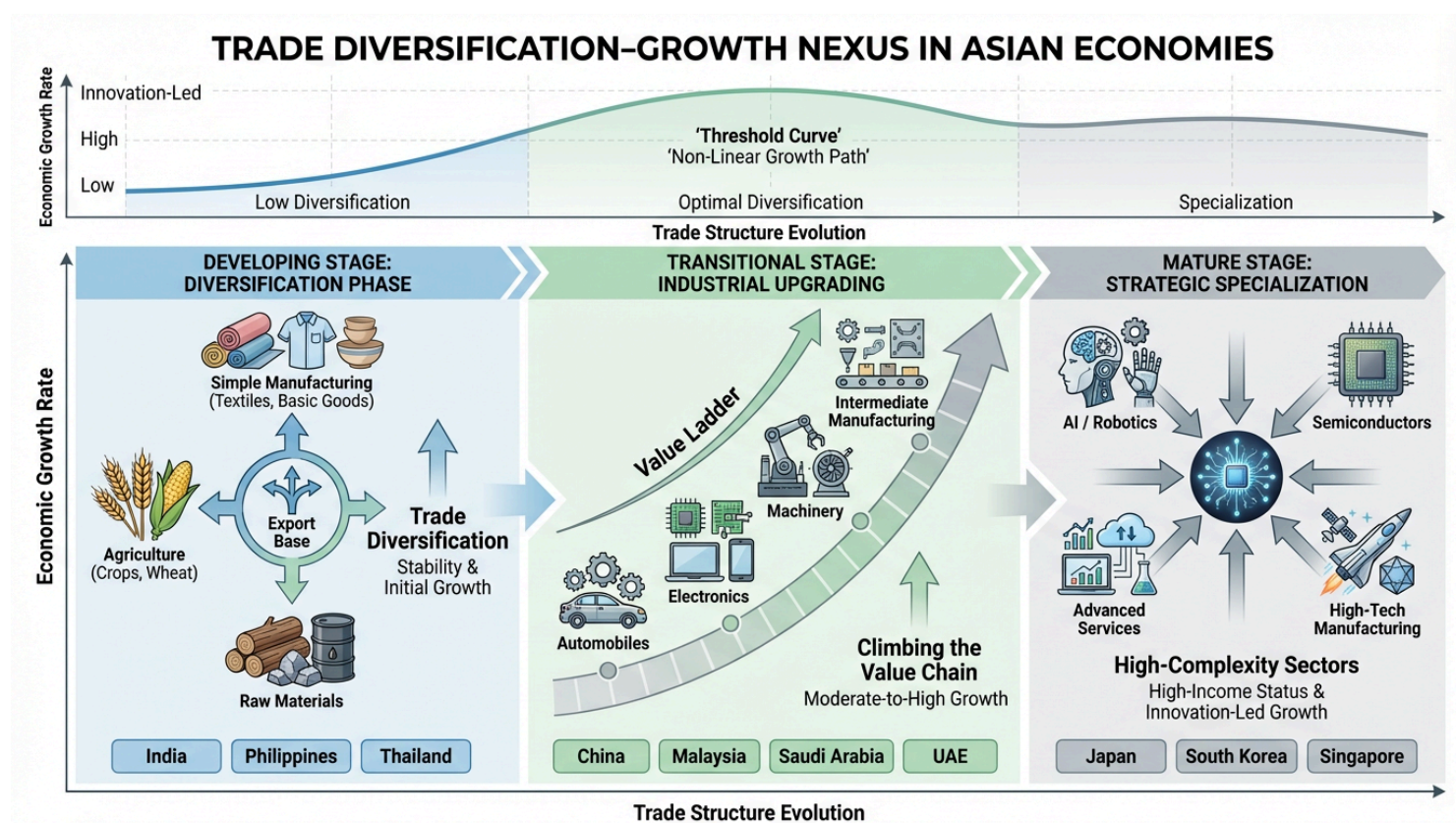


Figure 1

The inverted U-shaped relationship between trade diversification and economic growth.

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