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The Impact of Export Diversification on Unemployment Rates in Developing Countries

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ABSTRACT

Export growth plays an important role in the economy of any country, especially developing countries, due to its impact on trade growth and economic growth. Therefore, the sustainability of export growth rates can be considered an important issue for developing countries. Most studies have proven that export diversification is an effective solution to this issue due to its pivotal role in preventing export concentration deficiency. And since one of the most important macroeconomic goals is to increase the employment rate in the country. The question arises whether export diversification can help increase the employment rate? For this purpose, this study attempts to examine the effect of export diversification on the unemployment rate in developing countries in three groups with different income levels during the years 2008 to 2022 using a generalized system moments model. The results show that in all three groups of countries, export diversification has been able to reduce the unemployment rate. This indicates a positive effect of export diversification on employment.

KEYWORDS: Export diversification, Employment, Gross domestic product, Foreign investment, Higher education level, System generalized moments

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1. Introduction

In the history of development literature, one of the most strategic approaches to sustainable development has been the enhancement of the export sector. The significance of trade, particularly exports, for economic growth has been extensively discussed in the economic development literature (e.g., Emly, 1967; Keesing, 1967; Michaely, 1977; Feder, 1982; Edwards, 1993). The fundamental reasons for the importance of export expansion and its impact on economic development include: First, export development in a country allows for investment to be concentrated in sectors where the country holds a comparative advantage, which, according to neoclassical trade theory (Heckscher, 1919; Ohlin, 1919; Samuelson, 1948), likely increases overall productivity through specialization. Second, access to larger international markets enables the expansion of the export sector within a country's economy. Third, global competitive pressures are likely to reduce inefficiencies in export production, leading to the adoption of relatively efficient methods in the trade sector. Finally, a country that prioritizes its export sector utilizes its productive resources—including physical capital, human capital, and advanced technologies in production, management, and training of a highly skilled workforce (Fosu, 2013). These reasons for the importance of exports are often emphasized for developing economies, particularly low-income economies with small domestic markets (UNCTAD, 2018).

Historically, the importance of trade for growth and development has been grounded in classical theory (the Heckscher-Ohlin-Samuelson model), which posits that countries should specialize in the production and export of goods in which they have a comparative advantage. However, more recent theoretical and empirical studies have emphasized the importance of export diversification over export specialization (Herzer & Nowak-Lehmann, 2006). This paradigm shift can be traced to several factors. First, export diversification is now recognized as having a favorable impact on the pattern of growth and structural transformation experienced by countries and regions. Second, it has been found to enhance a country's ability to achieve objectives such as job creation and improved income distribution (Hausmann & Klinger, 2006; Huang, 2006). Third, export diversification reduces the volatility of export revenues and fluctuations in imports and capital, which tend to hinder growth (Fosu, 1991, 2001). Specifically, to address the challenges of relative instability associated with commodity export concentration, the current perspective is that countries should pursue export diversification in terms of both partners and products. Market diversification refers to entering new markets not previously covered by existing goods, while product diversification involves adding new products or services to the range of goods in existing markets.

There appears to be a strong correlation between poor export diversification and unfavorable employment outcomes in developing countries, particularly in low-income nations (Ozako, 2015). Meaningful and stable job creation typically requires relatively high and sustained growth, in which export diversification can play a significant role by allowing a country to spread the risk of fluctuations across a broader range of countries and products, thereby protecting against actual and potential trade shocks and commodity price volatility (Tang et al., 2022). Indeed, it is generally believed that significant progress in the structural transformation of several Asian

countries has resulted from a shift toward export product diversification, moving from primary product exports to manufactured goods and utilizing more labor for the production of advanced products (World Bank, 1993; Sarl, 1996).

A major concern regarding the export patterns of developing countries is their instability, which has been shown to cause considerable harm to growth. This instability may also spill over into capital or import volatility, both of which can act as deterrents to growth (Fosu, 1991, 2001) and have adverse implications for job creation. For instance, trade in Africa is highly concentrated, with very limited diversification and exports dominated by primary commodities, consistent with neoclassical trade theory (Wood & Mayer, 2001). Meanwhile, Sub-Saharan African (SSA) countries currently experience some of the highest unemployment rates in the world, with an average official unemployment rate of 8% between 2010 and 2014, compared to 11% in the Middle East and North Africa. In contrast, South Asia and East Asia and the Pacific recorded average rates of 3.9% and 4.4%, respectively, during the same period. Indeed, for many developing countries, vulnerable employment—comprising poor workers with low incomes and no job benefits—is significantly higher than the global average. For example, in Sub-Saharan African countries, this form of employment reached 68%, compared to a global average of 42.9% in 2016 (Ailo, 2017).

Given the significant impact of export diversification on reducing unemployment rates and fostering job creation, this paper seeks to address the following questions:

1. Can export diversification influence unemployment rates in developing countries?
2. Does the effect of diversification on unemployment rates differ across countries with varying per capita income levels, categorized into low-income, lower-middle-income, and upper-middle-income groups, and in which countries is the impact greater?
3. Can economic growth lead to a reduction in unemployment rates?
4. Can education and workforce training, essential for producing higher-technology goods and diversifying export products, reduce unemployment rates in the three groups of developing countries under study?
5. Can the level of foreign investment influence job creation and reduce unemployment rates in the three groups of countries under study?

To address these questions, this paper first reviews the theoretical literature on the relationship between export diversification and employment in developing countries. It then examines the impact of other variables, including foreign investment, gross domestic product, and education levels, on unemployment rates. In the second section, evidence on the effects of employment and export diversification is presented based on relevant empirical studies. In the third section, a model is developed, and data for the years 2008 to 2022 for developing countries across the three income groups are estimated using the System Generalized Method of Moments (SYS-GMM). In the final section, the results are analyzed, and recommendations are provided to promote export diversification with a focus on its impact on employment and reducing unemployment rates.

2. Literature Review

The Impact of Export Diversification on Unemployment Rates

The theoretical foundation for the relationship between trade and employment can be traced back to classical economists. Ricardo (1817) introduced the theory of comparative advantage, suggesting that a country should specialize in the production and export of goods in which it has a comparative advantage. However, Ricardo's formulation had specific limitations. First, it did not account for the role and impact of the structure and composition of trade in the development process. Second, it overlooked other factors of production, such as capital and technology, focusing solely on the value of labor. Subsequently, Heckscher and Ohlin (HO) expanded Ricardo's framework, arguing that developing countries would specialize in producing primary products, where they hold a comparative advantage due to abundant land and unskilled labor. A key aspect of what later became the Heckscher-Ohlin-Samuelson (HOS) framework was that countries, through import-substitution policies and increased exports, would generate employment by specializing in production and exports. If trade can stimulate economic growth, it may increase employment through derived demand. The question, however, is how the benefits of this economic growth are distributed among the various factors of production (Sharma & Aditya, 2023).

The Stolper-Samuelson theorem, which proposes a one-to-one correspondence between product prices and factor prices, suggests that trade liberalization is likely to increase demand for resources used in producing exportable goods. If trade liberalization occurs in developing countries, it can lead to increased employment of labor. Based on existing policies, two scenarios may arise: first, protectionist policies may restrict the production of goods, thereby reducing employment. In contrast, trade policies, particularly trade liberalization and export growth, stimulate employment in sectors producing goods that benefit from liberalization. However, such goods should not be primary products. In fact, the production of resource-based goods (e.g., minerals) is likely to be relatively capital-intensive and have minimal impact on employment. Thus, the critical question is to what extent export diversification entails relatively labor-intensive production and, consequently, greater employment compared to primary product production (UNCTAD, 2018).

Labor theory suggests that greater reliance on full-time employment by firms is likely to result in relatively meaningful and less vulnerable employment. Therefore, if export diversification leads to such outcomes, it is preferable to specializing in primary products. Structural economic development theories assume that export diversification fosters sustainable growth and development (Chenery, 1979; Syrquin, 1989). This perspective is grounded in the notion that a larger share of production leads to greater long-term growth in developing countries (Jiang et al., 2022).

One potential channel through which sustainable economic growth and development are achieved via export diversification is the reduction of vulnerability to export shocks and exchange rate fluctuations caused by volatile primary commodity prices. Technology spillovers

have also been identified as a channel through which export diversification positively impacts growth and employment (Agosin, 2007). It is believed that new technologies, knowledge, and practices are byproducts of export diversification, stemming from trade-related spillovers. Countries with low technological levels can expand their technological frontiers and comparative advantages by imitating and adapting technologies accessed through exports and value-added activities (UNCTAD, 2018). Additionally, studies have focused on the role of terms of trade in growth and employment. For example, the Prebisch-Singer hypothesis (Prebisch, 1950; Singer, 1950) posits that more diversified exports, including a broader range of manufactured products, are beneficial for growth and employment. This hypothesis is underpinned by the concept of low income and price elasticities of demand for primary products. Lower income elasticity suggests that the relative price of primary products declines in the long term as countries become wealthier, and, given the relatively inelastic price demand, export revenues decrease. A key policy implication of the Prebisch-Singer hypothesis is import-substitution industrialization, pursued by developing countries in the 1960s and 1970s. This theory provides a rationale for developing economies to shift from primary products to diversified manufacturing and possibly services. Furthermore, it predicts that the benefits countries derive from participating in international trade remain unequal depending on the nature of their exports. While countries primarily exporting primary goods—typically developing countries—increasingly lose out in trade due to deteriorating terms of trade, countries exporting manufactured goods—typically industrialized developed countries—benefit in the long term, according to this theory (Chichava et al., 2023).

Overall, there has been a significant theoretical shift over the years. Early classical and neoclassical economic thought posited that a country should specialize in producing and exporting goods in which it has a comparative advantage, utilizing the factor it possesses in relative abundance. This implied that developing countries would primarily produce and export primary products and import-substitution goods. In contrast, newer theories emphasize the need for export diversification toward industrial goods in developing countries. Indeed, empirical evidence seems to align with these recent theories, as countries pursuing export diversification have performed better in terms of sustainable growth and development. Moreover, the theory of derived demand suggests that such growth is likely to result in relatively high labor demand, leading to increased employment. However, the rate of increase depends on the nature of the labor force and the technology employed.

In general, the impact of export diversification on employment can be examined from the following perspectives:

Economic Growth and Structural Transformation: Export diversification can lead to higher economic growth, enabling countries to transition from low-value to high-value goods, which can create more job opportunities (Hess, 2008).

Labor Demand and Productivity: Diversifying products can enhance labor productivity and the value added in various production sectors, increasing labor demand across different sectors (Song, 2011).

Employment by Skill Level: Export diversification can have varying effects on different skill levels. Product diversification may expand low-skill jobs, while geographical diversification may promote high-skill jobs (Sharma, 2023).

Income Inequality: The impact of export diversification on income inequality through the employment channel can be non-linear. It may initially increase income inequality but, over time, reduce it by creating higher-paying jobs and supporting women's employment (Tchitchoua et al., 2023).

Impact of Other Factors on Unemployment Rates

Impact of Foreign Direct Investment on Unemployment Rates

Previous studies report varied relationships between foreign direct investment (FDI) and employment. Rong et al. (2020) and Li et al. (2019) found that FDI inflows have a positive effect on employment. Rong et al. (2020) explained that FDI can directly increase job creation and facilitate the transfer and reemployment of domestic labor across regions or industries. FDI inflows can directly contribute to job creation in the host country. When foreign companies invest in the local economy, they establish new operations such as factories, offices, or service centers. These investments require labor, leading to direct job opportunities. Foreign firms hire local workers to staff their operations, thereby enhancing employment prospects for the domestic workforce. Additionally, FDI can facilitate the transfer and reemployment of domestic labor in different regions or industries. When foreign companies invest in a specific sector, they bring new technologies, management practices, and market knowledge. This specialization can lead to the upgrading of local industries and the development of new sectors, potentially increasing demand for skilled workers in these areas. Moreover, Li et al. (2019) found that FDI can play a role in fostering communication and collaboration among different ethnic groups, which, in turn, can contribute to increased job opportunities, aligning with neoclassical theory.

In contrast, Sokhanvar and Jenkins (2022) found that FDI inflows can negatively impact economic growth due to investment inefficiencies, leading to low real economic returns on assets. When governments guarantee high financial returns for foreign investors but achieve low real economic improvements, these investments can hinder economic growth. This occurs because the financial returns provided to foreign investors ultimately represent an economic cost that exceeds the economic benefits derived from the investment. Jude and Silaghi (2016) found that FDI can have both negative and positive effects on employment. Foreign-affiliated companies, often equipped with advanced technologies and efficient production methods, may introduce capital-intensive technologies and labor-saving techniques in the host country. Additionally, the adoption of capital-intensive technologies and labor-saving methods by foreign-affiliated companies may give them competitive advantages over domestic firms. Domestic companies may reduce their workforce to compete with foreign-affiliated firms in terms of efficiency and cost-effectiveness. However, FDI can positively impact employment when domestic firms linked to foreign-affiliated companies through supply chains or subcontracting

arrangements experience technology transfers, skill enhancements, or increased business opportunities, leading to job creation (Najin et al., 2024).

Impact of Education Levels on Unemployment Rates

Previous studies on the impact of education levels on employment rates have yielded mixed results. For instance, Laurinavičius et al. (2015) assessed the effect of education on unemployment rates and income in Latvia. Their study found that higher education levels in the Latvian labor market are positively associated with employment. A recent study by RCC (2021) on youth employment in the Western Balkans indicated that education levels influence youth employment prospects, with individuals with lower education levels experiencing lower employment rates compared to those with higher education. However, Arif et al. (2019), using ILO (2014) data for Armenia, Macedonia, Montenegro, Serbia, and Moldova, found that school education has no significant impact on the likelihood of young people finding employment. In contrast, Riddell and Song (2011) examined the effects of education on unemployment and employment in the United States using an OLS model and concluded that education has a positive and significant impact on employment. However, a contradictory finding was reported by Gad (2021), who analyzed the role of different education levels in unemployment and job acquisition in Egypt using logistic regression models. They found that unemployed individuals without education are more likely to return to work. Meanwhile, Hajdari and Fatai (2022) investigated the effect of education levels on employment rates in six Western Balkan countries using probit and logistic models. Their results indicate that individuals with higher education levels are more likely to be employed compared to those with lower education levels in these countries.

Impact of Economic Growth on Unemployment Rates

The relationship between employment and GDP growth has been extensively studied in both developed and developing countries since the early 1990s, primarily through the lens of employment elasticity, based on Solow's (1956) aggregate production function, Okun's (1962) law, and Goldin's (1995) U-shaped hypothesis. Previous studies suggest two strands of literature regarding the relationship between employment and economic growth. One strand indicates a positive relationship between employment and economic growth, while the other suggests a negative relationship. For example, Padalino and Vivarelli (1997), Pianta (1995), and Pini (2001) found a positive relationship between employment and GDP in G-7 countries. Other studies, including Rutkowski et al. (2005), Sengenberger (2006), Kapsos and Nesporova (2006), Ghazali and Mouelhi (2018), Bhat et al. (2022), and Manioudis and Meramveliotakis (2022), concluded that GDP growth has a positive but modest impact on employment growth in the countries studied, largely due to market stagnation during the periods examined. In contrast, Grogger (2022) estimated a positive and elastic effect of GDP on reducing unemployment rates. Conversely, a negative relationship between economic growth and unemployment rates has been

reported in studies by Fofana (2001), Ajilore and Yinusa (2011), and Leshoro (2014). Meanwhile, Islam and Nazara (2001), Islam (2004), Serneels et al. (2012), and Haider (2023) reported a weak relationship between employment and GDP growth in developing countries, primarily in Asia and Africa. UNCTAD (2013) showed that in most less-developed countries, employment elasticity has declined over time. Similarly, a recent study by the International Labour Organization (2020) found that employment elasticity decreased between 2008 and 2018, indicating that GDP growth has had a limited impact on employment growth in recent years.

Empirical Literature Review

Sharma and Aditya (2023), in an article titled "Shifting Trade Patterns, Information and Communication Technology, and Employment: Cross-Country Evidence," examined the impact of export diversification, information and communication technology, and employment at various skill levels using a panel data model for samples of 45 and 33 countries from 1990 to 2019 and 1995 to 2019, respectively. The results indicate that export concentration on more products can lead to the creation of new job opportunities. Tchitchoua et al. (2023), in an article titled "Export Diversification and Income Inequality in Central Africa: An Analysis Through the Employment Channel," investigated the effect of export product diversification on income inequality and employment in 9 Central African countries from 2000 to 2019 using a quadratic regression for panel data with random effects and the two-stage least squares method. The results show that export diversification can contribute to greater employment and, consequently, reduce income inequality in these countries. Jiang et al. (2022), in a study titled "The Impact of Agricultural Employment and Export Diversification on the Environmental Pollution Index: Establishing an Agenda Toward Sustainable Development," examined the impact of agricultural employment and the export diversity index on the ecological footprint using AMG, CCE-MG, FMOLS, and DOLS models for 96 countries from 1991 to 2018. The results indicate heterogeneous short-term and long-term effects between agricultural employment and the export diversity index on the ecological footprint. The findings suggest that increasing exported products leads to higher employment in the agricultural sector and can increase pressure on the ecological footprint, which can be addressed by advancing environmentally friendly technologies toward sustainable development.

Tang et al. (2022) investigated the causal relationship between innovation, industrial production, agricultural sector employment, export diversification, government expenditures, and income inequality in 73 countries using the Dumitrescu-Hurlin causality test for the years 1970-2015. Additionally, to examine the short-term and long-term relationships among these variables, they employed the cross-correlated effects mean group and fully modified ordinary least squares methods, respectively. The results of this study indicate a positive and significant relationship from innovation, industrial production, and export diversification to income inequality and employment. There is also a significant positive relationship from income inequality to government expenditures and industrial production. The results from examining short-term elasticities show that export diversification has a positive and significant effect on income

inequality, innovation and industrial production have insignificant effects on income inequality, and agricultural sector employment and government expenditures have no significant effects on income inequality. Finally, the results from examining long-term elasticities using the fully modified ordinary least squares method indicate that innovation and increased industrial production reduce income inequality and lead to increased employment.

UNCTAD (2018), in an article titled "Export Diversification and Employment," examined the effect of export diversification in South African countries from 1991 to 2010 using a system GMM model. The results indicate a positive and significant relationship between export diversification and increased labor demand in this group of countries.

Songoh and Winkler (2012), in an article titled "Exports and Export Diversification in Sub-Saharan Africa: A Post-Crisis Growth Strategy," assessed the effects of exports and export diversification on value added, labor productivity, and conditional and unconditional labor demand in a panel of 30 selected African countries for the period 1995-2008. They found that product and market export diversification increases value added and labor productivity but has minimal impact on labor demand.

Naude and Rossouw (2011), in an article titled "Export Diversification and Economic Performance: Evidence from Brazil, China, India, and South Africa," estimated the impact of export diversification on employment for Brazil, China, India, and South Africa using an applied general equilibrium model for the period 1962-2000. They found that export diversification has positive effects on employment, except in South Africa, where export concentration has a more beneficial impact on employment compared to other countries. Additionally, considering the U-shaped relationship between a country's export basket and economic development, they concluded that export diversification is beneficial for employment only in the early stages of development. Edwards and Golub (2004), using firm-level data for the period 1997-1998, observed that export diversification has negative effects on labor demand for both skilled and unskilled workers in large South African manufacturing firms.

Milner and Wright (1998), in an article titled "Modeling Labor Market Adjustment for Trade Liberalization in an Industrial Economy," used a panel data method for the years 1980-1995 to examine the effect of trade liberalization on employment levels in Mauritius. Their findings indicate that trade liberalization has led to greater industrialization and export diversification in Mauritius, increasing overall employment and particularly employment for women. In domestic research, no article was found that directly examines the effect of export diversification on employment. Therefore, in this research, for the first time in domestic studies, the effect of export diversification on job creation in developing countries is examined.

Model Specification

The present study is of an analytical-descriptive nature and examines the impact of export product diversification on employment in developing countries, categorized into three income groups: 17 low-income countries, 19 lower-middle-income countries, and 19 upper-middle-

income countries, over the period 2008–2022. The proposed model is based on the work of Sharma and Aditya (2023) and the UNCTAD (2018) report, specified as follows:

$$\ln UM_{it} = \beta_1 \ln GDP_{it} + \beta_2 \ln EXDiv_{it} + \beta_3 \ln Fd_{it} + \beta_4 \ln SET_{it} + \beta_5 \ln UM_{it-1} + u_t$$

Variables:

EXDiv_it: Export product diversification
GDP_it: Gross domestic product
FDI_it: Foreign direct investment
SET_it: Higher education
UM_it: Unemployment rate
u_t: Error term

Data Description

The variables used in the study are described as follows:

Export Product Diversification (EXDiv_it): Export product diversification refers to an increase in the number and variety of exported goods and a reduction in dependency on a single source of income. Data for this variable are sourced from the International Monetary Fund (IMF). The IMF calculates the export diversification index, including the overall, intensive (within), and extensive (between) Theil indices, following the definitions and methodologies outlined in Cadot et al. (2011). To this end, dummy variables are first created to classify each product as "traditional," "new," or "non-traded." Traditional products are those exported at the beginning of the sample period, while non-traded products have zero exports throughout the entire sample period. Thus, for each country and product, the dummy values for traditional and non-traded products remain constant across all years in the sample. For each country/year/product group, products classified as "new" must not have been traded in at least the previous two years and must then be exported in the subsequent two years. Consequently, the dummy values for new products may change over time.

The overall Theil index is the sum of the intensive and extensive components. The extensive Theil index for each country/year pair is calculated as follows:

$$TB = \sum k \, (Nk/N) \, (\mu k/\mu) \ln(\mu k/\mu)$$

The intensive Theil index for each country/year pair is calculated as follows, where k k k represents each group (traditional, new, and non-traded), Nk N_k Nk is the total number of exported products in each group, and μk/μ \mu_k/\mu μk/μ is the relative mean of exports in each group:

$$TW = \sum k \, (Nk/N) \, (\mu k/\mu) \, \{(1/Nk) \sum i \in Ik \, (xi/\mu k) \ln(xi/\mu k)\}$$

Export Value (X): The variable X X X represents the total export value, where x x x denotes the export value of individual products (International Monetary Fund, 2020).

Unemployment (UM_it): Unemployment refers to the share of the labor force that is without work but available for and actively seeking employment. It is calculated by dividing the number of job-seeking workers by the economically active population of a country over a one-year period.

Gross Domestic Product (GDP_it): GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy, plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are reported in U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single-year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

Foreign Direct Investment (FDI_it): Foreign direct investment refers to the net inflows of investment aimed at acquiring a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It includes the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital, as recorded in the balance of payments. This series represents net inflows as foreign investors, divided by GDP.

Higher Education (SET_it): The gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group officially corresponding to the specified level of education. Higher education, whether leading to an advanced research qualification or a degree with specific skills, typically requires, as a minimum condition of admission, the successful completion of secondary education (World Bank Data, 2022).

Error Term (u_it): The error term uit u_{it} uit, where i=1,2,…,n i = 1, 2, \dots, n i=1,2,…,n represents the countries under study, and t=1,2,…,n t = 1, 2, \dots, n t=1,2,…,n denotes time.

Data on gross domestic product, unemployment rate, higher education, and foreign direct investment are sourced from the World Bank database, while data on export diversification are extracted from the International Monetary Fund.

The expected signs of the variables in the research are as follows:

Table 1: Expected Signs of Variables

Variable Name	Symbol	Expected Sign
Export Product Diversification	LogEXD	Negative (-)
Higher Education	LogSET	Negative (-)
Gross Domestic Product	$\log GDP_i$	Negative (-)
Foreign Direct Investment	$Log\ FD_{it}$	Negative (-)
Lagged Unemployment Rate	$LogUM_{t1}$	Positive (+)

Model Estimation and Hypothesis Testing

Pre-Estimation Tests

Test for Cross-Sectional Dependence in Panel Data

Pesaran (2007) demonstrates that ignoring cross-sectional correlation can lead to significant bias and distortion in results. Additionally, to determine the appropriate stationarity test, the test for cross-sectional dependence must first be conducted. For panel data stationarity tests, various unit root tests can be employed, including the Generalized Dickey-Fuller, Levin, Lin, and Chu, Fisher, Im, Pesaran, and Shin, Hadri, and Pesaran tests (Baltagi, 2007). In the presence of cross-sectional dependence, the Pesaran CD unit root test, which accounts for cross-sectional dependence, should be used (Pesaran, 2007).

The null hypothesis of this test indicates no cross-sectional dependence among panel members, while the alternative hypothesis suggests the presence of cross-sectional dependence (De Hoyos and Sarafidis, 2006).

Table 2: Results of the Cross-Sectional Independence Test

Country Group	Probability	Statistic
Low-Income Developing Countries	0.000	33.655
Lower-Middle-Income Developing Countries	0.000	15.904
Upper-Middle-Income Developing Countries	0.000	16.641

According to the results obtained, the null hypothesis is rejected for all three country groups. Consequently, there is cross-sectional dependence among the variables in the model for all three groups. Given the presence of cross-sectional dependence, the Pesaran stationarity test should be used to examine the stationarity of the data.

Pesaran Stationarity Test

Given the results obtained from the cross-sectional dependence test and the presence of dependence among variables, the Pesaran stationarity test should be employed to assess stationarity. Based on the results of the Pesaran stationarity test, the data comprise a mix of stationary and non-stationary variables. Consequently, a cointegration test has been conducted subsequently.

Table 3: Results of the Pesaran Stationarity Test

	Low-Income Developing Countries			Lower-Middle-Income Developing Countries			Upper-Middle-Income Developing Countries		
Symbol	Coefficient	**Probability**	**Result**	**Statistic**	**Probability**	**Result**	**Statistic**	**Probability**	**Result**
LogEXD	-1.99	0.023	Stationary	-1.64	0.04	Stationary	0.5347	0.2964	Non-stationary
LogSET	-3.83	0.0001	Stationary	-3.96	0.000	Stationary	-4.06	0.000	Stationary
$\log GDP_i$	-1.87	0.3011	Stationary	0.09	0.5374	Non-	1.74	0.9589	Non-

						station ary			stationary
Log FD_{it}	0.93	0.8249	Non-stationary	-2.78	0.0028	Station ary	-0.0082	0.4967	Non-stationary
LogUM	1.57	0.9415	Non-stationary	-0.96	0.1689	Non-station ary	1.37	0.9142	Non-stationary
$LogUM_{t1}$	2.71	0.0034	Stationary	-1.45	0.0732	Station ary	-4.14	0.000	Stationary

Kao Panel Cointegration Test

In the analysis of panel data cointegration, the existence of long-term economic relationships is tested and examined. The purpose of cointegration analysis is to address the possibility that many economic time series may be non-stationary (containing stochastic trends). However, when examined over the long term, a linear combination of these variables may be stationary (without stochastic trends). Conducting a cointegration test facilitates the analysis of this long-term equilibrium relationship. One of the cointegration tests for panel data is the Kao cointegration test, in which the test statistic follows a standard t-distribution and can assist in determining the presence of cointegration in panel data.

Table 4: Results of the Kao Cointegration Test

Country Group	Probability	Statistic
Low-Income Developing Countries	0.018	-2.086
Lower-Middle-Income Developing Countries	0.000	-4.874
Upper-Middle-Income Developing Countries	0.008	-2.406

Based on the results obtained from the Kao cointegration test, the null hypothesis of no cointegration among the model variables is rejected. Consequently, the existence of a long-run relationship among the estimated model variables is confirmed, which ensures that the estimated regression is not spurious.

Endogeneity Tests

One of the critical issues in regression estimation concerns the endogeneity or exogeneity of explanatory variables. A variable is considered endogenous if it exhibits significant correlation with the disturbance (error) term. If the explanatory variables in the model are endogenous, then estimating the model using single-equation ordinary least squares (OLS) will yield biased and inconsistent estimators. A common question arises: assuming that a variable is endogenous, can it still be treated as exogenous in an appropriate model? If the regressors are truly exogenous, the OLS estimator is more efficient. However, depending on the strength of the instruments and other factors, ignoring this efficiency and instead employing instrumental variable (IV) estimators may be justified. Therefore, whenever there is a genuine need for instrumental variables, the use of OLS should be replaced accordingly. To test for endogeneity, the Sargan difference test can be employed. Furthermore, this test can be applied to determine the

exogeneity of a subset of endogenous regressors, regardless of the type of weighting matrix used. If the calculated test statistic exceeds the critical value at the 95% significance level (or if the p-value of the test statistic is less than 0.05), the null hypothesis H_0 of exogeneity is rejected.

Table 5: Results of the Sargan Endogeneity Test

Country Group	Probability	Statistic
Low-Income Developing Countries	16.66	0.000
Lower-Middle-Income Developing Countries	14.77	0.000
Upper-Middle-Income Developing Countries	10.39	0.000

According to the obtained results, the null hypothesis of exogeneity is rejected, indicating that all variables are endogenous. Therefore, the ordinary least squares (OLS) method cannot be used to estimate the model, and estimation techniques such as two-stage least squares (2SLS) or the generalized method of moments (GMM) must be employed (Arellano & Bond, 1999). The 2SLS estimator may yield large variances for the estimated coefficients due to potential difficulties in selecting appropriate instruments, which could result in statistically insignificant estimates. Hence, the system GMM approach is recommended to address this issue. The application of the GMM method offers several advantages, including accounting for individual heterogeneity, utilizing more information, and eliminating biases inherent in cross-sectional regressions, leading to more precise estimates with higher efficiency and reduced multicollinearity (Baltagi, 2007).

Over-identifying Restrictions Test (Hansen's J Test)

The diagnostic test for over-identifying restrictions in dynamic panel data models estimated via the system generalized method of moments is known as Hansen's J test. This test is used to assess the validity and appropriateness of the instrumental variables employed in the model. Specifically, it evaluates whether the model's moment conditions are consistent with the assumption of over-identification. Under the Hansen J test, the null hypothesis states that the instrumental variables used in the model are valid. If the J statistic exceeds the corresponding critical value, the null hypothesis is rejected, implying that the model is misspecified and the instruments are not valid.

Table 6: Results of Hansen's J Test

Country Group	Hansen's J Test	
	Probability	Statistic
Low-Income Developing Countries	0.1267	1.53
Lower-Middle-Income Developing Countries	0.2639	1.37
Upper-Middle-Income Developing Countries	0.7279	0.35

Given the results obtained from the Hansen test, the null hypothesis has not been rejected. Consequently, the instrumental variables employed in the model possess adequate validity.

Results of Model Estimation

One of the appropriate econometric methods for addressing or mitigating the problem of endogeneity of indicators and multicollinearity among explanatory variables is the Generalized Method of Moments (GMM). The application of the GMM approach offers several advantages, including accounting for individual heterogeneity, utilizing more information, and eliminating biases inherent in cross-sectional regressions. As a result, GMM yields more precise estimates, higher efficiency, and reduced multicollinearity. The GMM method is particularly applicable when the number of cross-sectional units (N) exceeds the number of time periods or years (T) (N > T), a condition satisfied in this study, where the number of countries surpasses the number of time periods (Baltagi, 2007).

In light of the above considerations, the System Generalized Method of Moments (SYS-GMM) has been employed to estimate the model over the period 2008–2022. The estimation results for developing countries, categorized into three income groups, are presented in Table 2. The model incorporates various explanatory variables, including export diversification, gross domestic product, foreign direct investment, level of higher education, lagged unemployment rate, and a constant term, which are used as instrumental variables.

Table 7: Estimation Results of the Model Across Three Country Groups

	Low-Income Developing Countries		Lower-Middle-Income Developing Countries		Upper-Middle-Income Developing Countries	
Symbol	**Coefficient**	**Probability**	**Coefficient**	**Probability**	**Coefficient**	**Probability**
b	-0.199	0.000	-16.57	0.000	-13.52	0.000
LogEXD	-0.071	0.000	-0.179	0.000	-0.2126	0.006
LogGDP	-0.274	0.071	0.358	0.001	-0.4283	0.000
LogSES	-0.095	0.004	-0.194	0.058	-0.1669	0.005
LogUM	-0.255	0.010	-0.173	0.000	0.2345	0.000
$Logum_{t1}$	0.231	0.000	0.201	0.000	0.2963	0.000

The research findings indicate that during the study period, the effect of the export product diversification variable on the unemployment rate in low-income developing countries is -0.0711185, in lower-middle-income developing countries is -0.179668, and in upper-middle-income developing countries is -0.212602. In all three groups, the coefficient is negative and statistically significant at the 5% level, suggesting that export diversification has a significant negative impact on unemployment in the selected countries. Since a higher diversification index (closer to one) reflects greater variety in export products, and a decrease in the unemployment rate implies an increase in employment, the existence of a negative relationship indicates that export product diversification leads to higher employment rates across all three groups of developing countries. However, the smaller magnitude of this effect in low-income developing countries, compared to the other groups, can be attributed to their economic structure, which is still heavily reliant on agricultural goods and primary commodities, resulting in limited progress toward export diversification—exemplified by many African countries—and thus a weaker impact on employment. In contrast, upper-middle-income developing countries have achieved a

considerably stronger employment-enhancing effect through export diversification, as seen in countries such as China.

Furthermore, the results show that the impact of GDP on the unemployment rate during the study period is 0.2739535 in low-income developing countries, -0.3581309 in lower-middle-income countries, and -0.4282637 in upper-middle-income countries. The effect is negative and significant at the 10% level in low-income countries and at the 5% level in the other two groups, indicating that economic growth exerts a significant negative effect on unemployment across all three groups of developing countries. Increased economic growth can stimulate investment and, consequently, generate more employment opportunities. This effect is particularly pronounced in upper-middle-income developing countries.

Regarding the variable for higher education, the estimated effects are 0.0953819 in low-income countries, -0.1940352 in lower-middle-income countries, and -0.1669522 in upper-middle-income countries. In all three groups, the coefficient is negative and statistically significant at the 5% level, demonstrating that higher levels of workforce education and specialization positively influence employment prospects. However, the relatively weaker effect observed in low-income developing countries may be due to their lower level of development and the predominance of employment in agriculture and handicrafts, where advanced education may not significantly enhance employability.

The results also reveal that foreign direct investment (FDI) has coefficients of -0.2547062, -0.1728467, and -0.2354267 in low-income, lower-middle-income, and upper-middle-income developing countries, respectively. In all three groups, the effect is negative and significant at the 5% level, indicating that increased FDI in developing countries leads to capital inflow and the creation of new jobs, thereby reducing unemployment rates in host countries.

Finally, the results for the lagged unemployment rate show coefficients of 0.2014336 in low-income countries, 0.2014336 in lower-middle-income countries, and 0.2962677 in upper-middle-income countries. All are positive and statistically significant at the 5% level, indicating that the lagged unemployment rate has a positive and significant effect on current unemployment, reflecting persistence in unemployment dynamics across the selected developing countries.

Conclusion and Policy Recommendations

Reducing unemployment and enhancing employment levels constitute one of the most critical objectives in any country's economy, particularly in developing nations. Achieving this goal can significantly contribute to higher income levels, improved welfare, greater societal satisfaction, and ultimately place a country on a sustainable path of growth and development. A primary concern for policymakers in every economy is thus the promotion of employment. To this end, one of the fundamental strategies for boosting employment is the expansion of export activities. In recent years, economic policymakers have increasingly emphasized export diversification and its impact on national economies. Export diversification refers to increasing the variety of exported goods and reducing dependence on a single source of revenue. This strategy is particularly important due to various factors, including the price volatility of primary commodity

exports in global markets and the consequent high fluctuations in trade revenues compared to manufactured goods. As such, export diversification has attracted considerable attention from policymakers in many developing countries.

The primary objective of this study is to investigate the relationship between export diversification and employment generation in developing countries. Drawing on previous research, numerous studies have demonstrated a positive and significant relationship between export diversification and employment growth.

In this study, the effects of export diversification, gross domestic product (GDP), higher education, foreign direct investment (FDI), and the lagged unemployment rate on employment levels were examined across three groups of developing countries with different income levels, using the System Generalized Method of Moments (SYS-GMM). The findings indicate that the impact of export diversification on employment is positive and statistically significant in all three income groups. However, the magnitude of this effect increases with higher income levels, suggesting that the employment-enhancing benefits of diversification are more pronounced in upper-middle-income countries. This disparity may be attributed to the greater production and export of manufactured goods in higher-income developing countries, compared to the continued reliance on primary commodities in lower-income nations. Indeed, it can be argued that enhancing export diversification—through the development of exports based on comparative advantages, the reduction of primary commodities in export baskets, and the mitigation of export revenue volatility—can lead to sustained increases in employment in the long run.

Therefore, it is reasonable to expect that countries capable of developing a diverse and balanced export portfolio are more likely to attract new investments and generate employment opportunities. Furthermore, the findings confirm that improvements in education levels, increased inflows of foreign direct investment, and sustained economic growth also play significant roles in reducing unemployment and promoting job creation in developing countries.

Policy Recommendations:

1. **Promote Export Diversification:** Policymakers in developing countries, especially low- and lower-middle-income nations, should prioritize policies that support the diversification of their export structures. This includes investing in value-added industries, fostering technological advancement, and supporting sectors with high employment potential.
2. **Invest in Human Capital:** Expanding access to higher education and vocational training can enhance workforce skills and employability, particularly in industries linked to diversified exports. Governments should allocate resources to improve the quality and relevance of education to meet labor market demands.
3. **Attract Foreign Direct Investment:** Creating a favorable investment climate through institutional reforms, infrastructure development, and legal protections can attract FDI, which in turn stimulates job creation and technology transfer.

4. **Support Industrial Development:** Encouraging the transition from primary commodity exports to manufacturing and services can increase resilience to external shocks and amplify the employment benefits of trade.
5. **Implement Coordinated Economic Policies:** A holistic approach that integrates trade, industrial, education, and investment policies is essential to maximize the employment gains from export diversification and economic growth.

In conclusion, this study underscores the importance of export diversification as a key driver of employment in developing countries. When complemented by sound macroeconomic policies and investments in human and physical capital, diversification can serve as a powerful tool for inclusive and sustainable development.

The key to ensuring export diversification lies in establishing a conducive environment that minimizes risks associated with long-term investment, as it is precisely such investments that are likely to drive sustainable export diversification, foster long-term economic growth, and generate employment in developing countries. Below are policy recommendations aimed at enhancing export diversification—particularly in developing nations—with a positive impact on employment:

1. **Establishing a Capable, Accountable, and Development-Oriented Government:** Governments should be proactive, transparent, and institutionally strong, actively facilitating private sector participation in export promotion and product diversification. Effective governance is essential for creating stable economic conditions and implementing strategic industrial policies.
2. **Enhancing National and Regional Strategic Infrastructure:** Developing and implementing optimal infrastructure policies can significantly reduce trade costs, business risks, uncertainties, and export-related expenses. Investments in transportation, energy, digital connectivity, and logistics not only improve competitiveness but also facilitate regional market integration, enabling cross-border trade expansion.
3. **Innovative Financing Mechanisms for Export-Oriented Firms:** Introducing innovative financial instruments—such as direct credit lines, export subsidies, and risk-sharing facilities—can support export-driven enterprises. Priority should be given to emerging export sectors with high growth potential. Subsidy frameworks must be carefully designed to avoid rent-seeking behavior and instead incentivize productivity, innovation, and competitiveness in industry and trade.
4. **Strengthening Institutional and Regulatory Frameworks:** Robust legal, regulatory, and institutional systems are crucial for ensuring contract enforcement, property rights protection, and transparency. These factors increase investor confidence—both domestic and foreign—and create a stable foundation for long-term investment in diversified production and export activities.
5. **Supporting Small Businesses in Accessing Export Markets:** Small and medium-sized enterprises (SMEs) often face significant barriers to entering international markets. Governments should provide technical assistance, export training, market intelligence, and

access to trade networks to help SMEs integrate into global value chains and diversify export offerings.

6. **Investing in Human Capital and Skilled Labor Development:** Long-term diversification requires a workforce equipped with higher education and advanced technical skills. Strategic investment in education, vocational training, and research and development (R&D) can build a skilled labor force capable of supporting technology-intensive and value-added export industries.
7. **Attracting Foreign Investors and Building Foreign Confidence:** Creating a stable and secure environment for foreign investment is essential. This includes maintaining macroeconomic stability—such as controlling inflation and avoiding recessions—as well as ensuring legal security, political stability, and protection of foreign investors' rights. A trustworthy investment climate encourages foreign direct investment (FDI), which can bring capital, technology, and access to international markets, all of which contribute to export diversification and job creation.

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Authenticity of the texts, honesty and fidelity has been observed.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.