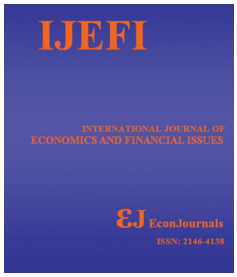

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External Capital Resources and Export Diversification in Developing Countries

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ABSTRACT

Developing countries have been trying to diversify their exports baskets since 1990s. Particularly, these countries are striving for export diversification through external capital resources inflow in the economy. This study attempts to explore the impact of external capital resources i.e. foreign direct investment inflow, remittances received, foreign aid and total external debt on export diversification. Moreover, this study utilizes a balanced panel of sixty five developing countries over the period 1995-2021 by employing a newly developed panel data estimation method, cross sectional Auto Regressive Distributed Lag (CS-ARDL). The robustness is checked by another novel estimation technique i.e. Method of Moments Quantile Regression (MMQR). The estimation methods are expounding heterogeneity and endogeniety. Empirical examination for four forms of foreign capital inflows do provide varying degree of significant contribution for increasing export diversification. Three capital resources are significant contributors whereby one of these resources are warranting export concentration. Further, these findings suggest that optimal inflow of external capital can be useful for sample countries and their productive use of external capital resources can serve as crucial channel to affect export diversification.

Keywords: New Trade Theory, Cross Sectional Auto Regressive Distributed Lag, Method of Moments Quantile Regression, External Capital
JEL Classifications: F10, F20, F35, O33

1. INTRODUCTION

Export diversification is one of the key challenging tool to accentuate international trade. The developing countries being limited in it constraint the growth impact on various economic fronts (Bekkers et al., 2024; Tripathi, 2023). Exports serve as a primary conduit for earning vital foreign exchange, directly addressing the foreign currency constraints that can otherwise impede the acquisition of essential capital goods, technology, and intermediate inputs necessary for productivity enhancements and industrial progress (Egyir et al., 2020; Freund and Pierola, 2015). Many developing countries export a handful of primary and resource based goods, remaining at the edge of export concentration (Handoyo and Ibrahim, 2021). A more diversified export portfolio is robustly associated with greater economic stability, enhanced resilience to external shocks, and richer opportunities for technological absorption and capability building as economies engage in more complex production processes. Hence, the advantages, notwithstanding related to diversified export base may be limited for developing economies (Akash et al., 2023).

Expansion or diversification in production base requires multiple resources. The relevant resources are not only physical and natural, but the acquaintance with capital and financial resources reinforces product diversification (Lloyd and Marin, 2024). Moreover, expansion in production makes the economy deviate from its comparative advantage, which remained a core of classical trade theory. Thus, deviation from comparative advantage diverts the attention towards “new trade theory.” Undoubtedly, exports

are focused to increase export earnings (McNown et al., 2018). Concentrated exports containing primary and natural resource based produce remain volatile in international markets (Ross, 2019). Many developing countries e.g. Chile, Tunisia, Botswana, China and Brazil, pursued export diversification and tremendously achieved sustainable export earnings (Liu et al., 2018). Keeping in view its importance certain indices are constructed to measure it. These indices are market concentration and product concentration indices. To fulfil the purpose, product export diversification is adapted in this study, which is measured for merchandise exports through Herfindhal-Hirschman Index (HHI), and is measured by SITC. Formally, data for this variable is taken from UNCTAD 2022 database. It ranges from 0 to 1. The convergence towards 0 shows higher diversification and vice versa so the interpretation of this variable would be done in reverse form.

Despite giving importance to infrastructure, human capital and linking it to growth through export diversification, it needs to further dwell into other factors which can be helpful in enhancing export diversification especially for developing countries. Unsurprisingly, export diversification is a structural transformation framework closely connected with economic growth. The close connection of both aspects in the economy expounds to reassess the external capital flows which are key sources of financial capital (Egyir et al., 2020). These financial capital flows reduces the saving investment gap in the economy and may reassure structural transformation through export diversification. Last three decades witness the financial capital inflow in developing countries, which include Foreign Direct Investment (FDI), Remittance received (REM), Foreign Aid (AID) and total External Debt (EXD). Despite potential benefits of these resources to add in export diversification, the opposite claim of significant impact of capital flows to warrant export concentration should also be highlighted. Although foreign capital flows kept influencing economic growth but the impact of foreign capital inflows on export diversification is unclear. Moreover, the direction of impact is also inconclusive so, the impact of foreign capital flows on export diversification needs to be explored deeply. Understanding the interplay between these enabling factors and effective export promotion strategies remains a key area of inquiry. Consequently, this research seeks to investigate the importance of external capital inflows in fostering export diversification in developing economies, aiming to provide actionable insights for policymakers striving to harness international trade for sustainable development.

For analysis, the study employed a sample of sixty five middle income developing countries for the period 1995-2021. The sample middle income countries are selected on the basis of data availability. The export diversification strategy was adopted by many countries in 1980s as many developing countries kept pursuing trade protection policies till late 1980s. However, low and middle income countries adapted export diversification policies offering their industrial and commercial policies in the beginning of 1990s. It took a further boost through the wave of globalization till mid 1990s, so the selected period shows an adapted diversification of exports by the selected countries. The new trade theory is tested, which despite conventionally relevant policy explanatory variables, specifically considers the role of major external capital flows to influence the diversification in export basket. The selected countries are showing relative similarity in the trends of the variables and possess almost similar level of development and less difference in the external capital inflow in them, thus, the panel of these countries is formed. More often, low income countries are evaluated with middle income countries and are counted as developing countries but the rationale behind this study is to assess middle income countries. It is always not rational to focus on developed countries for raising a research question therefore, the selected panel is restricted to middle income/developing countries.

In order to estimate the model, dynamic panel model and Quantile regression methods are preferred over static panel data models, so the endogenity and heterogeneity issues are assessed through employed estimation methods. Thus, estimation is carried out through mean regression technique to impact outcome variable i.e. Cross Section Auto Regressive Distributed Lag Model (CS-ARDL) and the robustness is checked through Method of Moment Quantile Regression (MMQR) to impact outcome variable. The employed panel data techniques deal with heterogeneity and endogeneity. The former method provides mean impact, whereas the later gives parameter of each variable on quantiles of outcome variable. The novelty of the paper is multifaceted as it is considering novel determinants, and also employing a newly developed panel data estimation techniques for knowing the impact of regressors on dependent variable. After giving introduction to the research question in section 1, the next section is giving relevant literature review, which is followed by empirical model, data sources and estimation in section 3. Section 4 provides discussion of empirical results. Lastly, conclusion and policy suggestions are made in section 5.

2. LITERATURE REVIEW

Literature in economics deals with export diversification through several aspects. Numerous economic hypothesis exist to test the interdependence of capital flows, innovations, trade and growth. It remained imperative ever that growth and capital flows, trade and capital flows affect one another (Olubiyi, 2014). Initially, the research studies kept focusing on infrastructure related variables, institutional reforms and domestic credit as major determinants of export diversification (Bertelet et al., 2022; Fosu, 2021; Ngassam, 2024; Rehman and Sohag, 2023). Various researchers put their efforts to find the impact of export diversification on economic growth in various panels of countries (Gözgör and Can, 2017; Parteka and Tamberi, 2013; Yalta and Yalta, 2021).

Early research in determinants of export diversification focused on market size so the pioneer study was conducted for 99 countries to find the effect of market size on export diversification in the duration of 1980 to 1999 (Al-Marhubi, 2000). It was strongly recommended to expand market size to attain diversification at product and market level. Moreover, certain other factors were considered by researchers to expand the production base which generally included human capital, infrastructure and institutional reforms. A study was conducted in Brazil by employing data on states of the economy for the period 2003-2013 to explore the successful diversification scenario for exports (Oliveira et al.,

2020). System GMM was employed as estimation method. The central west and northeastern states experienced relatively higher diversification spikes during the said period in the country. Education, patent per capita and infrastructure remained significant contributors for diversification in export basket. Likewise, trade cost also took an added advantage when it was believed to reduce trade cost to enhance trade activities including export diversification. Some previous studies kept linking trade cost with export diversification along with employing variables related to logistic infrastructure, which proved significant improvement in export diversification (Bensassi et al., 2015; Fugazza and Hoffmann, 2017; Gani, 2017).

Pointing the attention towards external resources let the researchers add FDI and AID along with other determinants to assess the enhancement in export diversification. The assessment of long-run determinants of export diversification was made for 53 African countries for the period spanning from 1995-2011 by employing System GMM (Elhiraika and Mbate, 2014). The robust evidence to add in export diversification was made in favor of per capita income, infrastructure, human capital and institutional reforms. It was further envisaged in the study that FDI and AID are international capital flows and can take either sign for their coefficients to impact export diversification. Reason of non-conformity regarding signs relate to the absorptive capacity of the host economy. FDIs are market seeking and perform to add in export diversification basket provided these are not concentrated to enclave natural resource sector. It is quality not quantity of FDI that matters to impact diversification in exports. Similarly, trade liberalization took another stance to add in export diversification but it remained unfortunate for lower middle income countries to diversify export by reducing trade barriers. It was envisaged in a study of 44 developing countries for the period 1970-2015 domestic production pushes export diversification (Osakwe et al., 2018). A recommendation was made in favor of domestic production which pushes export diversification. Furthermore, defied comparative advantage took the main stage in determinants of export diversification larger countries are prone to more export flow and reduce volatility in output.

Further studies made the involvement of human capital, competitiveness and innovations as relevant policy determinants in favor of export diversification. A study was conducted for 64 developing countries classified into three categories i.e. low, middle and high income countries for the period 2010-2018 (Handoyo and Ibrahim, 2021). Employing Poisson pseudo-maximum likelihood estimation method, the study unravels the significant impact of GDP and human capital in promoting export diversification for three categories of countries. Furthermore, competitiveness index and innovation index also showed improvement in export diversification for middle income countries whereby reverse is observed for low income and all countries sample.

External capital resources in many developing countries fuel the strategy of export growth, economic growth and diversify export basket. FDI brings many potential benefits to host economy like technology and knowledge spillovers. It formally generates benefits like new jobs creation, competition advancement and human capital build up. It lifts the economy from self-sustaining to structurally transformed mode. REM increases income of families in host economy. Despite, it also provides entrepreneurial development giving rise to overall welfare benefits game in the host economy. It addresses capital constraints and in consequence, boost consumption cum investment demand (Saadi, 2020). AID fosters economic transformations in favor of exports by financing infrastructure, enhancing production capacity, and supporting trade-related institutions in developing countries. Similarly, EXD, if invested in export-oriented sectors, can help diversify the export base and open access to new markets. Foreign capital generally enhances exports in host economy but the effect on diversification of export basket may vary. Generally, the output in host economy expands due to four forms of international capital (FDI, AID, REM and EXD). The reason maybe that of their analogous nature. However, the sustainability of these resources depend on a prudent optimal management and their assurance that they are very well aligned with national development priorities.

Although a diverse variety of determinants of export diversification is discussed above, yet the studies focusing external resources in the form of external capital flows for knowing the impact on export diversification are limited. It is perhaps, taking the variety of explanatory variables to divulge above mentioned four core determinants of export diversification is appropriate for this study. In fact, developing countries keep suffering their savings investment gap to finance their investment. External capital can mask the shortage of domestic capital. It is certain from previous empirical review that most of work on drivers of export diversification, employed regression estimations, which could provide the mean impact of explanatory variables on outcome variable through static models. Thus the mean impact of explanatory variables is observed with CS-ARDL which is a novel dynamic estimation method. The robustness is checked by employing another novel estimation method i.e. MMQR.

3. MODEL SPECIFICATION, DATA AND METHODOLOGY

3.1. Data, Material and Methods

The primary objective of the study is to determine the impact of external capital resources on export diversification of developing countries over the period 1995-2021. These nations are striving to achieve diversification in their export basket but data for one or the other variable is missing. Hence, we could not include all developing countries in the analysis. Thus, the sample is restricted to sixty five developing countries and the list of selected countries for this study is available in Appendix C. The data on export diversification is taken from UNCTAD. Then external capital resources are included because of their vitality to reduce S-I gap and increase the investment base for promoting export diversification. Empirical evidence suggests that financial development in the country can highlight its key importance in broadening the export basket. The IMF database constructed a comprehensive index by linking and merging the depth, access and efficiency of financial institutions in a country. Many studies have used this measure over the other measures of financial development (Wang et al., 2025; Zhang et al., 2025). A few more

studies highlighted the importance of physical capital in promoting export diversification and hence proxied it for capital in the country (Abdulsahib, 2024; Adekunle, 2025; Amjed and Shah, 2021).

Thus, Gross capital Formation (GCF) is added as a control variable in our study. Then, GDP per capita is included in real terms to proxy and represent economic activity. This variable is also used in other studies to portray economic activity in the country (Canh and Thanh, 2022; Mano, 2024; Sarin et al., 2022). In addition to these variables, Trade openness (TOP) is also used to comprehensively portray the extent of openness of the economy. It is also used in few other studies (Millogo et al., 2024; Wani, 2024; Yusuf et al., 2024). Export growth is still a valid phenomenon in many developing countries. Although the developing countries are striving to diversify their exports, yet the export growth even in terms of export concentration cannot be neglected for these countries. Data for these variables is taken from WDI. The detailed description of variables along with their measurement units and sources is portrayed in table and is presented in Appendix A.

3.2. The Model

The baseline model used in the analysis takes the following form

$$D_{it} = \alpha_0 + \alpha_1 XCR + \alpha_2 FD_{it} + \alpha_3 GCF_{it} + \alpha_4 TOP_{it} + \alpha_5 GDP_{it} + \alpha_6 XG_{it} + \varepsilon_{it} \quad (1)$$

Where $i = 1,\ldots,65$ and $t = 1995,\ldots,2021$

Where D_{it} represents export diversification which is determined mainly by External Capital Resources (XCR), each represented by FDI, REM, AID and EXD. The control variables are Financial Development Index (FD), Gross Capital Formation (GCF), Per capita Income (GDP), Trade Openness (TOP), Export growth (XG) and ε represents an error term. The D_{it} has evolved to be a comprehensive export diversification measure and is preferred over indices representing horizontal diversification and vertical diversification separately. A combined measure of both represent the comprehensive view of export diversification at product level for a country and is measured by Herfindhal Hirschman Index (HHI). D_{it} is getting popularity as a complete and preferred indicator. Therefore we preferred it over other measures[1]. It is also adapted by other studies. The predictable sign of FDI, AID, and TOP are negative (Abiola Olawale, 2024; Ul-Haq et al., 2025; Yenilmez, 2024). The predictable sign for XG is positive, the expected sign for estimates of the rest of the variables can either be positive or negative.

3.3. Econometric Methodology

The sample is more than 20 in terms of number of years and cross sections, hence the interdependence may remain high among cross sections and alarms the presence of Cross Sectional Dependence (CSD) quite high (Zoundi, 2017).

3.4. Cross Sectional Dependence

Developing countries are closely interconnected in not only cultural orientation but their economic activities are also alike. Thus interdependence in countries is possible in multiple ways and the evidence of cross sectional dependency among them especially in exports cannot be ruled out. Cross correlation occurs quite frequently, possibly due to economic and policy connectedness, omitted common factors and spatial spillover effects (Pesaran, 2006; 2021). It is vital and initial step to confirm the presence of CSD in panel data analysis because it helps in deciding to employ either first generation or second generation unit root tests. To fulfil the purpose various CSD tests which include Pesaran CD test, Breusch Pegan LM test, Pesaran scaled LM test and Bias corrected Scale LM test are applied (Baltagi et al., 2012; Breusch and Pagan, 1980; Pesaran, 2021). In the presence of CSD, the size properties of data do not allow first generation unit root tests (Banerjee et al., 2001). In this case second generation unit root is more suitable and CIPS is applied (Pesaran, 2007). The cross sectional averages are taken in it which are shown below.

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} ti(N,T) \quad (2)$$

The CIPS is gaining popularity in literature of economics because it deals with CSD and heterogeneity.

3.5. CS_ARDL

The link among variables is examined by applying augmented version of traditional panel ARDL-PMG known as CS-ARDL (Chudik and Pesaran, 2015; Pesaran et al., 1999). The CS-ARDL framework includes short run and long run parameters of each variable concerned. This method has few advantages over the other methods which provide mean value of parameter for the outcome variable. Concisely, it provides robust estimates when variables are integrated of order I(0) and I(1), gives accurate estimates in presence of short run and long run CSD, also represents mean group estimation with heterogeneous slope coefficients. The CS-ARDL estimation method rules out estimates of each cross section with cross sectional averages, entailing unobserved common factors and then lags as proxies (Chudik et al., 2017). Moreover it deals well with weak exogeniety which more specifically occurs due to lagged dependent variable in model. The baseline regression equation for the proposed model is described above in equation 1.

3.6. Robustness Check MMQR

The standard regression analysis provides estimation for average relationship between explanatory and response variable. The estimation methods give partial view of relationship among variables. The conventional regression method gives mean effect but the information about explanatory variables on different quantiles of response variables can be addressed through novel technique of panel quantile regression in estimating the impact of external capital alongside economic and sustained growth variables on Di can avoid the limitations of conventional regression technique. Initially the quantile regression was proposed to find the effects of explanatory variables on response outcome (Koenker, 2004). The underlying approach provided comprehensive information for effect of independent variables on different locations of dependent variable especially when the error term is not normally distributed (Zhu et al., 2018).

$$D_{it} = \alpha_i + X_{it}\beta \quad (3)$$

1 The value towards zero shows diversification and vice versa, so the interpretation of variables with Di is in reverse form

Concisely, given X_{it} (the explanatory variables for export diversification, presented in equation 1) across the conditional quantile distribution of D_{it} and is;

$$Q_{Dit}\left(\tau_K|\alpha_i, x_{it}\right) = \alpha_i + X'_{it}\beta(\tau_p) \quad (4)$$

Equation 4 shows that τ^{th} quantile of the outcome variable *Di* and X_{it} is the vector of explanatory variables for each cross section *i* (country) at time *t* for quantile τ^{th}, whereas β depicts coefficients of explanatory variables of quantiles. Quantile regression lets slopes of regression line to vary across each quantile. Hence, conditional quantile regression considering fixed effects are;

$$Q_{Dit}\left(\tau_K|\alpha_i, x_{it}\right) = \alpha_i + X'_{it}\beta(\tau_p) \quad (5)$$

α_i shows unobservable individual effects and *X* stands as the matrix of explanatory variables whereas *K* is the quantile index shown as a subscript (τ_K) in equation 5. Solving minimization problem gives the estimation which can be shown as

$$min_{\alpha,\beta} = \sum_{K=1}^{K}\sum_{t=1}^{T}\sum_{i=1}^{N}\omega_K\rho_{\tau K}[D_{it} - \alpha_i - X_{it}^T\beta\left(\tau_p\right)] \quad (6)$$

Where ω_K stands for k^{th} quantile's weight, *T* is the time period for each cross section and *N* portrays the number of cross sections, $\rho_{\tau K}$ is piecewise linear quantile loss function.

By adding α_i as a regression parameter, the standard value of individual effects can be estimated as;

$$min_{\alpha,\beta} = \sum_{K=1}^{K}\sum_{t=1}^{T}\sum_{i=1}^{N}\omega_K\rho_{\tau K}[D_{it} - \alpha_i - X_{it}^T\beta\left(\tau_p\right)] + \lambda\sum_{i=1}^{N}\alpha_i \quad (7)$$

λ is a parameter to account for decreasing individual effect to zero and gauges well the robustness for estimating β. The above-mentioned standard quantile function is not providing unobserved heterogeneity within panels. The proposed novel technique of quantile regression via moments captures heterogeneous effects (Machado and Silva, 2019). The MMQR is the way to alter means and include fixed effects to provide the impact on entire distribution (An et al., 2021; Aziz et al., 2020). Moreover, MMQR does provide location and scale model which can be expressed as follows;

$$Q_{Dit}\left(\tau|X_{it}\right) = \left(\alpha_i + \delta_i q\left(\tau\right)\right) + X'_{it}\beta + Z'_{it}\gamma q(\tau) \quad (8)$$

The component $\alpha_i + \delta_i q(\tau)$ shows scalar parameter of cross section *i* at quantile τ. *Z* is the vector of components of *X*. Equation 8 shows time invariant individual effects and does not show intercept shift so, the optimization problem solved by MMQR is;

$$minq_i \sum_i\sum_t \rho_\tau(\hat{R}_{it}\left(\hat{\delta}_t + Z'_{it}\hat{\gamma}\right)q) \quad (9)$$

$\hat{\delta}_t$ stands for standard loss function of quantile.

$$\tau = (\tau AI[A>0] + (\tau\text{-}1)AI[A\leq 0]) \quad (10)$$

4. RESULTS AND DISCUSSION

Table 1 provides the descriptive statistics which portrays that means are almost uniform across the dataset for all variables. Standard deviation shows instability in XG. The value of XG is minimum amongst all whereas GCF is highest among all variables.

Table 2 depicts the correlation matrix for employed variables. The value of correlation coefficient does not exceed 0.7 which describes the presence of no multicollinearity among regressors.

Cross Sectional dependence has become a vital issue to address the macro panel data analysis. It is important that a shock in one country spreads across other countries. Therefore, it is important to control CSD for providing unbiased results. Henceforth, we performed Breusch Pegan LM test to confirm the presence of CSD and the results in Table 3 confirm the presence of CSD in our dataset.

The further step in the panel data analysis is to test stationarity of variables. For this purpose, second generation unit root tests are performed and are reported in Table 4. The results illustrate that few variables are stationary at level or I(0), while a few are stationary at first differencing, I(1). None of the variables is I(2).

The Table 4 portrays that all the variables are stationary at level I(0), except REM, EXD and TOP which are stationary at first order I(1). Hence these variables are used in estimation with first difference.

The Herfindhal-Hirschman index (HHI) calculated for merchandise exports is used as dependent variable and is multiplied by 100 to normalize by following a few studies (Elhiraika and Mbate, 2014; Handoyo and Ibrahim, 2021; Oliveira et al., 2020; Saleem et al., 2022). It is used as a proxy of export diversification Di.

$$Di = HHI = \frac{\sqrt{\sum_{i=1}^{n}(x_i / X)^2} - \sqrt{1/n}}{1 - \sqrt{1/n}} \quad (11)$$

Table 1: Descriptive statistics

Variable	Mean	Standard	Min	Max
Di	69.864	11.967	36.711	93.610
FDI	3.564	4.608	−37.173	55.070
REM	5.876	7.917	−59.036	72.877
AID	0.035	0.049	−0.040	0.533
EXD	0.524	0.381	−0.001	3.408
FD	0.231	0.131	0.000	0.777
GCF	25.963	12.952	−26.624	172.947
TOP	4.212	0.462	2.750	5.564
GDP	2.735	4.946	−19.748	81.355
XG	4.475	49.346	−467.675	329.054

Source: Author's compilation

Table 2: Correlation analysis

Variables	Di	FDI	REM	AID	EXD	FD	GCF	TOP	GDP	XG
Di	1									
FDI	0.082	1								
REM	0.015	0.044	1							
AID	0.190	0.026	0.384	1						
EXD	0.081	0.124	0.132	0.27	1					
FD	−0.560	−0.048	−0.121	−0.37	−0.085	1				
GCF	0.102	0.213	0.005	0.12	−0.046	−0.031	1			
TOP	−0.014	0.344	0.172	0.19	0.293	−0.065	0.281	1		
GDP	−0.362	0.021	−0.170	−0.40	−0.067	0.522	−0.113	−0.102	1	
XG	0.048	0.093	−0.043	−0.01	−0.013	−0.033	0.008	0.100	0.001	1

Source: Author's compilation

Table 3: Cross sectional dependence

Variable	CD-test	p-value	corr	abs (corr)
Di	10.910	0.000	0.046	0.351
FDI	28.590	0.000	0.121	0.251
REM	32.530	0.000	0.137	0.450
AID	62.260	0.000	0.263	0.410
EXD	27.140	0.000	0.115	0.473
FD	112.890	0.000	0.492	0.581
GCF	16.520	0.000	0.072	0.313
TOP	27.040	0.000	0.114	0.393
GDP	67.640	0.000	0.295	0.318
XG	52.140	0.000	0.227	0.330

Source: Author's compilation

The intention of this study to review the impact of external capital resources on host economy in a panel of sixty five countries. FDI. REM and AID remain key external resources to add in exports diversification with both estimation methods. The results for CS-ARDL are reported in Table 5- while the results for MMQR are reported in Appendix B (Table A1 to A4):

Many studies reported positive impact of FDI on domestic output (Chaudhury et al., 2020; Wu et al., 2020). Similar was sought for impact upon Di. The multinational impact of FDI can be another crucial context to be realized. FDI aiming for cost discovery or are market seeking give a better scenario of Di. The trade between and among firms mainly accrue to foreign affiliates by improving technology, linkages among firms for importing capital content of exports, and managerial practices. The insignificant impact of FDI on export diversification is also depicted at a few quantiles can be better discussed under backward linkages where foreign firms overwhelmingly and crucially impact the gains of affiliates (Li et al., 2022). Evidently, it demonstrates through trade-off between level of foreign ownership and limit of local partners but to reshape operations in accordance with local contextualization is sure to hold when FDI inflow improves Di. The higher is the intensity of foreign ownership the higher is the impact accrued to the overall sector at local level (Girma et al., 2015). Linking insignificant impact on already existing export basket (export concentration) covers the spillover aspects and the absorptive capacity of the economy. More often, the impact remained low and negative for manufacturing and services sector and is also reported in literature (Bashir et al., 2023; Razzaq et al., 2021). The cost discovery aspect of FDI engages spillover effects which can candidly be attributed to absorptive capacity and technological gap between domestic and foreign counterparts of host economy (Reyes, 2017). The external financial resources are showing varying level of significance.

Similarly, the estimate of REM inflow shown in Model 2is also significantly improving export diversification in long run implying that remittances help increasing export diversification in developing countries. The significant relationship between REM and export diversification can be attributed to migrants who are well equipped with entrepreneurial abilities and seek new investment opportunities. In fact, knowledge and awareness of migrants concerning the new investment avenues inspire export diversification by encouraging investment in new lines of production linking them with pro export behavior (Saadi, 2020). Further, a migrant who is well aware of advantages of investment relies more on producing and introducing a new variety (Clemens and McKenzie, 2018). The argument goes in favor of knowledge and awareness which is acquired by exposure from the other country, aligning with income earned to spare the reasonable chunk of money for investment. Accordingly, significant contributory relationship of REM for various quantiles of Di is also an evidence in developing countries. The argument further strengthens the spillover effects which could affect exploring new avenues of investment backed by increase in entrepreneurship externalities caused by local entrepreneurs to enhance diversification in exports. The other reason might be the skilled migrants from developing countries who could have further acquired the ability to generate knowledge, skill and add in new norms of contributing in Di. Impact of AID upon Di are also portrayed in Model 3. The variable AID is significantly affecting Di for mean outcome and for various quantiles of Di, which reflects that AID contributes in the investment base of the economy and enhances capacity of production including infrastructure expansion which further strengthens Di (Hendy and Zaki, 2021).A proper channelizing of AID causes greater production and exports remain the visible reflection of domestic production which specifically relates to manufacturing sector (Saltarelli et al., 2020). Higher AID has spillovers of greater liberalization in trade policy which can promote exports (Sepehrdoust et al., 2019). AID closely associates with productive scheme to expand range of production and does provide diversified export basket (Gnangnon, 2019). It is also argued in literature that AID has an association with depreciation of real exchange rate in the host country and depreciation in real exchange rate links to higher Di (Gnangnon, 2021).

Table 4: Unit Root

Variables	CIPS			CADF		
	Level		First difference	Level		First difference
	t-cal	t-tab	t-cal	t-cal	t-tab	t-cal
Di	−2.340	−2.150		−2.340	−2.080	
FDI	−3.280	−2.150		−2.683	−2.080	
REM	−2.067	−2.150	−4.376	−2.051	−2.080	−0.4131
AID	−2.946	−2.150		−2.342	−2.080	
EXD	−1.998	−2.150	−4.323	−1.812	−2.080	−3.123
FD	−2.428	−2.150		−2.225	−2.080	
GCF	−2.120	−2.150	−4.465	−2.499	−2.080	
TOP	−1.701	−2.150	−4.471	−1.816	−2.080	−3.342
GDP	−3.676	−2.150		−2.749	−2.080	
XG	−4.048	−2.150		−2.871	−2.080	

Source: Author's compilation

Table 5: Results for CS-ARDL

Variables	Model-1		Model-2		Model-3		Model-4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Long Run								
FDI	−0.113**	0.055						
ΔREM			−4.174*	2.494				
AID					−207.577*	124.652		
ΔEXD							2.454*	1.425
FD	−6.917*	3.856	9.280*	5.061	−9.263**	3.655	−1.471	4.020
GCF	0.022	0.025	−0.048*	0.029	0.004	0.031	0.070*	0.037
GDP	0.069*	0.037	0.006	0.041	0.048*	0.028	−0.021	0.034
ΔTOP	−1.804***	0.585	0.053	0.821	−1.600*	0.889	−1.609**	0.725
XG	0.005	0.011	0.034*	0.019	0.018**	0.009	0.021*	0.012
C	26.109***	1.716	58.385***	14.646	61.668***	12.080	30.491**	3.391
Short Run								
DI	−0.665***	0.045						
FDI	−0.159***	0.073						
ΔREM			−6.538	4.321				
AID					−329.428	222.790		
ΔEXD							2.842	2.152
FD	−10.753	6.154	17.607*	9.398	−13.222**	6.059	−1.036	7.352
GCF	0.036	0.043	−0.091*	0.047	−0.008	0.051	0.111*	0.063
GDP	0.092*	0.049	−0.024	0.069	0.076	0.049	−2.911**	1.306
ΔTOP	−2.998***	0.938	0.415	1.318	−3.043**	1.484	−0.045	0.058
XG	0.007	0.016	0.053*	0.028	0.032**	0.016	0.038**	0.019
ECM	−1.665***	0.045	−1.689***	0.043	−1.799***	0.045	−1.701***	0.053
C	46.715***	3.655	106.423***	27.568	117.753***	23.254	57.643***	6.976

Source: Author's compilation

EXD is affecting export concentration for developing countries. The variable EXD has a statistically significant but inverse relationship with export diversification in developing countries, portrayed in Model 4. This implies that empirically, economies with more external debt do not endeavor towards export diversification does not have the potency to essentially induce in the production to add in new export lines and reshape the export scenario (Qambrani et al., 2024). It serves the survival objective in export concentration. Thus, developing economies that contract more level of external debt are at the advantage of export concentration. The inverse relationship augurs the importance of export concentration in developing economies indicating that these funds are used for productive investment activities and saves these economies from suffering inefficiencies and instability in already existing export lines (Mieno and Demachi, 2024). Importance of EXD for export concentration also favors the argument that developing economies portray their shallow domestic debt markets and external debt could increase export concentration.

Many developing countries borrow funds to finance consumption expenditures but the significant trade facilitation measures remain unaccommodated. EXD do not play its significant role for investment enhancing projects (Egyir et al., 2020). Diversified export base involves production capabilities and investment projects and EXD resolves liquidity constraint to attract investors (Afzal et al., 2024). EXD also lubricates industrial production but it sometimes increase exports in number but not in value (Akanbi et al., 2022; Edo and Oigiangbe, 2024).

The variable GDP shows market size in this study. It is a fact that countries produce those products for which their local demand is high (Ross, 2019). Larger market size produces

larger output, which also adds in Di. The impact of GDP on Di portrays its statistically significant effect shown in Model 2 and 4. Furthermore, more open economies buy more capital content to invest and produce. It is also portrayed in results in Model 1, 3 and 4 that TOP is significantly adding in Di.

Financial development index underscores the depth, access and efficiency of an economy's financial landscape. It is essentially important in shaping investment and exports of an economy. The results also indicate the importance of financial development index in developing economies. Improvement in financial development index reduces inefficiencies, brings transparency in transaction and ultimately promotes competitive environment for increasing export diversification (Islam et al., 2024; Riaz et al., 2024). The significant impact is portrayed in Model 1, 3 and 4.

GCF indicates the infrastructure of an economy which is portraying mixed results. It is adding in export diversification in Model 2 and 3 but the opposite is also indicated which specifies export concentration in Model 1 and 4. Infrastructure of developing countries is not widely acceptable for export diversification. Further, it does not provide a unique base and support for new export varieties. The results are also aligned with other studies (Jolo and Koç, 2023).

XG is an important sustaining element for growth in developing countries and it is adding in export concentration with statistical significance shown in Model 2, 3 and 4. It is giving a new indication towards policy scenario of developing countries by pointing the importance of export concentration throughout in the estimates. It indicates a key element, export base, which validates the importance of existing exports rather than encouraging new varieties. The results are similar in lines with another study (Balkanli, 2024).

5. CONCLUSION AND POLICY SUGGESTIONS

The study provided a view of relationship among external capital resources and Di. Given the nature and composition of exports three out of four external capital resources could enhance Di. Given the fact, a relative slow industrialization matches contemporary literature in developing countries. The reinforcements towards Di and new trade theory initiates with these factors and solely takes the foothold from classical trade theory. Among the factors related to external capital, FDI, REM and AID remain crucial elements to add in Di whereas reverse is warranted by EXD. The study suggests not to heavily rely on external capital flows as sufficient factors that can spur export Di. Quite noticeably, developing countries lack productive capacity base which disallows promotion of export diversification and lacking production of standard quality products to meet in international market harness the diversification in export basket. Suggestively, the developing countries should prioritize the inflow of FDI in accordance with local needs. The strategic promotion of FDI-export should be targeted to meet the challenge. Well-developed official channels to transfer remittances should be envisaged to promote volume of foreign exchange earnings. Technological diversification to provide facilities for remitting funds can also lead to diversify exports at reduced cost. Similarly, REM and AID might have been further well channelized to harness their impact upon Di. The skilled workers earning from abroad may be given crucial chances of small investment opportunities so as to realize their investment potential and add in Di. The significant impact of EXD on export concentration is diverting the attention to reduce reliance on external resources especially borrowing. It remains unusual that developing countries make their production basket well aligned with their endowed factors. Exploring more to add in value added products though using and exploring the internal resources can well manage their exports scenario. Similarly enhancing GCF and making economies more open will play a pivotal role in increasing Di. FD can become a more sustaining factor for the economy by strengthening the investment base of these economies. Higher and greater market size is always attractive for investors, and increasing GDP can enhance Di. Future research can further dig into more resources either capital or non-capital to diversify their production and exports basket. Regional level research can provide better insight into available regional resources which prone to add in export diversification. Country specific studies may provide a well-integrated solution to each country.

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APPENDIX A

Table A1: Results for FDI by MMQR

Var	Location	Scale	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
FDI	0.192***	−0.199***	0.620***	0.503***	0.393***	0.311***	0.246***	0.181***	0.117**	0.050	−0.022	−0.107	−0.207***
	(0.052)	(0.033)	(0.094)	(0.078)	(0.066)	(0.058)	(0.054)	(0.052)	(0.052)	(0.054)	(0.059)	(0.067)	(0.079)
FD	−51.619***	7.298***	−67.326***	−63.055***	−59.002***	−55.990***	−53.615***	−51.222***	−48.871***	−46.426***	−43.763***	−40.645***	−36.965***
	(2.156)	(1.345)	(3.871)	(3.224)	(2.703)	(2.402)	(2.237)	(2.154)	(2.158)	(2.244)	(2.430)	(2.760)	(3.255)
GCF	0.058**	0.003	0.051	0.053	0.055	0.056*	0.057**	0.058**	0.059**	0.060**	0.061**	0.063*	0.064
	(0.027)	(0.017)	(0.047)	(0.040)	(0.033)	(0.030)	(0.028)	(0.027)	(0.027)	(0.028)	(0.030)	(0.034)	(0.040)
ΔTOP	−1.694***	1.790***	−5.546***	−4.498***	−3.504***	−2.766***	−2.183***	−1.596***	−1.020*	−0.420	0.233	0.997	1.900**
	(0.614)	(0.383)	(1.099)	(0.917)	(0.769)	(0.684)	(0.637)	(0.613)	(0.614)	(0.639)	(0.692)	(0.786)	(0.925)
GDP	−0.185***	−0.011	−0.162*	−0.169**	−0.174**	−0.179***	−0.182***	−0.186***	−0.189***	−0.193***	−0.196***	−0.201***	−0.206**
	(0.055)	(0.034)	(0.097)	(0.081)	(0.068)	(0.061)	(0.057)	(0.054)	(0.054)	(0.057)	(0.062)	(0.070)	(0.082)
XG	0.001	−0.007**	0.017*	0.013	0.009	0.006	0.003	0.001	−0.001	−0.004	−0.007	−0.010	−0.013
	(0.006)	(0.004)	(0.010)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.009)
C	86.980***	−0.809	88.720***	88.247***	87.798***	87.464***	87.201***	86.936***	86.676***	86.405***	86.110**	85.764***	85.356***
	(2.526)	(1.577)	(4.489)	(3.758)	(3.159)	(2.810)	(2.618)	(2.516)	(2.518)	(2.626)	(2.852)	(3.230)	(3.783)

Source: Author's compilation

Table A2: Results for REM by MMQR

Var	Location	Scale	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
ΔREM	−0.095***	−0.161***	0.245***	0.164***	0.069	0.002	−0.053	−0.109***	−0.158***	−0.206***	−0.257***	−0.333***	−0.419***
	(0.032)	(0.021)	(0.064)	(0.054)	(0.044)	(0.038)	(0.035)	(0.032)	(0.031)	(0.032)	(0.033)	(0.039)	(0.047)
FD	−52.225***	7.592***	−68.280***	−64.448***	−59.951***	−56.799***	−54.221***	−51.539***	−49.256***	−46.984***	−44.589***	−40.987***	−36.893***
	(2.311)	(1.522)	(4.498)	(3.820)	(3.119)	(2.717)	(2.460)	(2.282)	(2.221)	(2.259)	(2.384)	(2.763)	(3.326)
GCF	0.067**	−0.002	0.070*	0.069	0.068*	0.068**	0.067**	0.067**	0.066**	0.066**	0.065**	0.064**	0.063
	(0.027)	(0.018)	(0.053)	(0.045)	(0.037)	(0.032)	(0.029)	(0.027)	(0.026)	(0.027)	(0.028)	(0.033)	(0.039)
ΔTOP	−0.960	1.804***	−4.774***	−3.864***	−2.796***	−2.046***	−1.434**	−0.797	−0.254	0.286	0.855	1.711**	2.683***
	(0.620)	(0.408)	(1.203)	(1.024)	(0.836)	(0.728)	(0.659)	(0.611)	(0.595)	(0.605)	(0.639)	(0.739)	(0.889)
GDP	−0.149***	−0.001	−0.146	−0.147*	−0.148**	−0.148**	−0.149***	−0.149***	−0.149***	−0.150***	−0.150***	−0.151**	−0.151**
	(0.052)	(0.034)	(0.100)	(0.085)	(0.070)	(0.061)	(0.055)	(0.051)	(0.050)	(0.051)	(0.054)	(0.061)	(0.074)
XG	0.002	−0.009**	0.021*	0.017*	0.012	0.008	0.005	0.002	−0.001	−0.004	−0.007	−0.011	−0.016*
	(0.006)	(0.004)	(0.011)	(0.009)	(0.008)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)
C	84.943***	−0.640	86.296***	85.973***	85.594***	85.328***	85.111***	84.885***	84.693***	84.502***	84.300***	83.996***	83.651***
	(2.549)	(1.679)	(4.918)	(4.204)	(3.444)	(2.995)	(2.707)	(2.511)	(2.448)	(2.487)	(2.634)	(3.021)	(3.627)

Source: Author's compilation

Table A3: Results for AID by MMQR

Var	Location	Scale	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
AID	−1.352	−11.504***	22.929***	16.761**	10.287*	5.549	1.931	−2.074	−5.648	−9.542**	−13.483***	−18.651***	−24.361***
	(4.423)	(2.893)	(8.358)	(7.061)	(5.841)	(5.110)	(4.690)	(4.392)	(4.309)	(4.429)	(4.756)	(5.445)	(6.453)
FD	−51.849***	6.130***	−64.788***	−61.501***	−58.051***	−55.526***	−53.598***	−51.464***	−49.560***	−47.485***	−45.384***	−42.631***	−39.587***
	(2.335)	(1.527)	(4.413)	(3.728)	(3.082)	(2.696)	(2.475)	(2.318)	(2.274)	(2.337)	(2.509)	(2.873)	(3.407)
GCF	0.065**	−0.003	0.070	0.069*	0.067*	0.066**	0.065**	0.065**	0.064**	0.063**	0.062**	0.061*	0.060
	(0.026)	(0.017)	(0.049)	(0.041)	(0.034)	(0.030)	(0.027)	(0.026)	(0.025)	(0.026)	(0.028)	(0.032)	(0.038)
ΔTOP	−1.165*	1.553***	−4.443***	−3.610***	−2.736***	−2.097***	−1.608**	−1.068*	−0.585	−0.060	0.472	1.170	1.941**
	(0.606)	(0.397)	(1.146)	(0.968)	(0.800)	(0.700)	(0.643)	(0.602)	(0.591)	(0.607)	(0.652)	(0.746)	(0.885)
GDP	−0.162**	−0.001	−0.160	−0.160*	−0.161**	−0.161***	−0.162***	−0.162***	−0.162***	−0.163***	−0.163***	−0.163**	−0.164**
	(0.053)	(0.035)	(0.100)	(0.084)	(0.070)	(0.061)	(0.056)	(0.053)	(0.052)	(0.053)	(0.057)	(0.065)	(0.077)
XG	0.003	−0.009**	0.023**	0.018**	0.013*	0.009	0.006	0.003	0.000	−0.003	−0.007	−0.011	−0.015*
	(0.006)	(0.004)	(0.010)	(0.009)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)
C	85.291***	0.306	84.645***	84.809***	84.981***	85.107***	85.203***	85.310***	85.405***	85.508***	85.613***	85.750***	85.902***
	(2.511)	(1.642)	(4.727)	(4.000)	(3.316)	(2.902)	(2.659)	(2.489)	(2.443)	(2.513)	(2.700)	(3.088)	(3.644)

Source: Author's compilation

Table A4: Results for EXD by MMQR

Var	Location	Scale	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
ΔEXD	2.474***	−2.151***	7.082***	6.003***	4.685***	3.811***	3.071***	2.371***	1.659***	0.950	0.175	−0.735	−1.801*
	(0.630)	(0.389)	(1.130)	(0.979)	(0.806)	(0.716)	(0.660)	(0.629)	(0.625)	(0.644)	(0.692)	(0.782)	(0.918)
FD	−51.169***	6.724***	−65.573***	−62.201***	−58.080***	−55.350***	−53.036***	−50.848***	−48.623***	−46.406***	−43.984***	−41.138***	−37.808***
	(2.140)	(1.320)	(3.834)	(3.321)	(2.734)	(2.428)	(2.239)	(2.135)	(2.120)	(2.184)	(2.347)	(2.653)	(3.112)
GCF	0.082***	−0.019	0.122***	0.113***	0.102***	0.094***	0.088***	0.082***	0.075***	0.069***	0.063**	0.055*	0.045
	(0.026)	(0.016)	(0.046)	(0.040)	(0.033)	(0.029)	(0.027)	(0.026)	(0.025)	(0.026)	(0.028)	(0.032)	(0.037)
ΔTOP	−1.880***	1.881***	−5.910***	−4.966***	−3.813***	−3.050***	−2.402***	−1.790***	−1.168*	−0.547	0.130	0.927	1.858**
	(0.613)	(0.378)	(1.098)	(0.950)	(0.783)	(0.695)	(0.641)	(0.611)	(0.607)	(0.625)	(0.672)	(0.759)	(0.890)
GDP	−0.144***	−0.029	−0.082	−0.097	−0.114*	−0.126**	−0.136**	−0.146***	−0.155***	−0.165***	−0.176***	−0.188***	−0.202***
	(0.051)	(0.032)	(0.092)	(0.079)	(0.066)	(0.058)	(0.054)	(0.051)	(0.051)	(0.052)	(0.056)	(0.064)	(0.074)
XG	0.004	−0.008**	0.022**	0.018**	0.013*	0.009	0.006	0.004	0.001	−0.002	−0.005	−0.008	−0.012
	(0.005)	(0.003)	(0.009)	(0.008)	(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)
C	86.313***	−0.030	86.376***	86.361***	86.343***	86.331***	86.321***	86.311***	86.301***	86.292***	86.281***	86.268***	86.254***
	(2.424)	(1.496)	(4.345)	(3.741)	(3.091)	(2.745)	(2.531)	(2.413)	(2.391)	(2.469)	(2.659)	(2.993)	(3.490)

Source: Author's compilation

APPENDIX B

Table B1: Definition, measurement units and source of data used in the analysis

Variable	Variable description	Definition	Units	Source
Di=HHI	Export Diversification	Herfindal−Hirschman Index	Normalized between 0 and 1	UNCTAD, 2022
FDI	Foreign direct investment	Net inflows of investment	% of GDP	WDI, 2021
REM	Remittances	Personal Remittances received	% of GDP	WDI, 2021
AID	Foreign aid	Net Official development assistance (ODA) received	% of GDP	WDI, 2021
EXD	External debt	Total external debt acquired	% of GDP	WDI, 2021
FD	Financial Development	Depth, access and efficiency	Index	IMF Data, 2022
GCF	Gross Capital Formation	Aggregate of gross additions to fixed assets	% of GDP	WDI, 2021
GDP	GDP per capita	Gross Domestic Product	Constant US Dollars	WDI, 2021
TOP	Trade Openness	Total Exports plus Imports as ratio of GDP	Index	WDI, 2021
XG	Export Growth	Exports of goods and services	(annual % growth)	WDI, 2021

Source: Author's compilation

APPENDIX C

Table C1: List of countries

Albania	Jamaica
Algeria	Jordan
Angola	Kazakhstan
Argentina	Kenya
Armenia	Kyrgyz Republic
Azerbaijan	Lao PDR
Bangladesh	Lebanon
Belarus	Mexico
Bhutan	Mongolia
Bolivia	Morocco
Bosnia and Herzegovina	Nepal
Botswana	Nicaragua
Brazil	Nigeria
Bulgaria	Pakistan
Cabo Verde	Papua New Guinea
Cambodia	Paraguay
Colombia	Peru
Congo, Dem. Rep.	Philippines
Costa Rica	Russian Federation
Dominican Republic	Samoa
Ecuador	South Africa
Egypt, Arab Rep.	Sri Lanka
El Salvador	Tanzania
Georgia	Thailand
Ghana	Tonga
Guatemala	Tunisia
Guyana	Turkiye
Haiti	Turkmenistan
Honduras	Ukraine
India	Uzbekistan
Indonesia	Vietnam
Iran, Islamic Rep.	Zambia
	Zimbabwe

Source: Author's compilation