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Do Innovation Strategies Shape Export Diversification? An Exploration from Middle Income Countries

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Abstract

It has been almost three decades that economies are striving for innovations to uplift their production frontier. This study endeavors to find the impact of Technology Choice Index (TCI) and patents to shape the export diversification scenario in sixty five middle income countries for the period 1995-2021. The countries are further segregated in two groups i.e. Upper Middle Income (UMI) and Lower Middle Income (LMI). The employed estimation technique is Method of Moment Quantile Regression (MMQR). The results favour both innovation strategies to affect diversification in exports. Moreover, higher incentives for innovative output and higher productivity for manufacturing produce will have stronger spillover effects upon diversified export frontier. Further, these findings suggest that adopting TCI should be at a balance between risks and benefits attached to it, as policy tool in these countries. The optimal increase in TCI and patents filing will remain a fortifying option for middle income countries to increase export diversification. Future studies need to dig export diversification at country specific sectoral level

Keywords: Innovations, Technology Choice Index (TCI), Patents, Method of Moment Quantile Regression (MMQR)

JEL Classification: F10, F20, O33

1. Introduction

It has been more than three decades that innovation is adapted as an explanation of economic uphold. The issue is still contentious and argues for ambiguity at theoretical and empirical fronts (Acemoglu et al., 2018; Acemoglu et al., 2016; Acemoglu et al., 2012; Sweet & Eterovic, 2019). Recent literature puts forth channels of acquiring technology and putting technological input to gain output, rests on the level of development. Since technological and economic valuations of innovations is a big challenge in empirical analysis of innovations. One way to evaluate innovations is industrial upgrade and manufacturing activity (Shiozawa, 2020; Zhou et al., 2021). The other involves diffusion of invention which involves production process (Bryan & Williams, 2021). Researchers in economics deal with innovations by measuring them through patents filed by residents and non-residents (Chen & Steinwender, 2021). Patents deal with product innovations and are used as proxy of innovation. The former endorses higher manufacturing activity which may be inconsistent with factor endowment in the economy (Bruno et al., 2015). An index i.e. Technology Choice Index (TCI) was proposed to gauge industrial upgrade and manufacturing activity.

$$TCI_{it} = \frac{VAM_{it}/LM_{it}}{GDP_{it}/L_{it}} \quad (1)$$

Where VAM_{it} is the value addition of manufacturing industries of country i at time t, LM_{it} is the labor in the manufacturing industry of country i at time t. GDP_{it} is the total value added of country i at time t and L_{it} is the total labour force of country i at time t. TCI reflects economic and industrial structure of economy. A few studies find the impact of TCI on economic growth (Bruno et al., 2015; Osakwe et al., 2018).

Similarly, some other explored TCI in the context of export diversification with a special focus on available infrastructure in the economy (Elhiraika & Mbate, 2014; Mania & Rieber, 2019). TCI involves the process of maneuvering the manufacturing activity and fascinatingly reflects industrial structure upgrade based on comparative advantage (Xue et al., 2022). The core lies in the innovative use of resources. It formally involves human capital in the form of labour. The higher value of TCI portrays higher manufacturing value added produce and more chunk of labour involved in manufacturing sector. Developing countries keep striving for higher manufacturing value added produce because of its sustaining nature and truly indicate their defied comparative advantage. Higher TCI value proposes faster industrial upgrade and reduces technological gap with developed countries. The latter involves invention to diffuse innovation i.e. patenting. Value of patents can be; fee or measuring licensing income (Bukari & Anaman, 2021; Schubert, 2021). The direct way is to inquire investor through a survey technique; about grant of patents (Lee & Sohn, 2019; Sohn et al., 2013). The methods are difficult to deal with, and disclosure of statement may remain vague for empirical studies. So the macro data on patent filing can serve as a measureable value of innovation (Khan & Malik, 2022; Ndubuisi, 2023).

Innovation frontier of an economy cannot rely only on imitation because certain Research and Development (R&D) activities require tacit knowledge for future technological advance and export performance (Debbarma et al., 2022). The evaluation of innovations is based upon production strategy which involves the panoramic view of trade theories. The settings of paper enclaves TCI, patents and export diversification under ‘new trade theory’ and ‘product life cycle model’ of trade (Amendola et al., 1993; Krugman, 1979; Posner, 1961; Prebisch, 1962; Singer, 1949; Vernon, 1966). The assumptions of model directly states that new products were produced by developed countries but moving one step further indicates the importance of model for other countries which are different stages of development. Indeed, these countries are also striving for technological and economic value of their produce.

Rationally, it enables countries to achieve sustainable economic scenario, realize scale economies, and access various markets. Also, the potency of benefits become sustaining if the phenomenon is optimally targeted and risks related to the phenomenon are mitigated. Export diversification is one of the key challenging tool to accentuate international trade and sustain an economy in globe. Many developing countries export a handful of primary and resource based goods, remaining at the edge of export concentration (Handoyo & Ibrahim, 2021). Hence, the advantages, notwithstanding related to export diversification may remain limited for developing economies.

Expansion or diversification in production base requires multiple channels and multiple benefits. Concentrated exports remain volatile especially when export bundle contain primary and natural resource based produce i.e. traditional primary goods (Ross, 2019). Indeed, export diversification has long been regarded as a critical pathway for economic resilience and sustained growth in developing countries. By broadening the export base and upgrading toward higher-value products, countries can reduce vulnerability to external shocks and foster structural transformation. Yet, many developing economies remain concentrated in low-technology goods and primary commodities, constraining their ability to integrate into

higher segments of global value chains (Liu et al., 2018).

Concisely, export diversification is an alteration in country's export structure (Umarxodjaeva, 2020). It provides catalyzing and sustaining economic growth, mitigating risk in price fluctuation (Ouedraogo et al., 2018). Keeping in view the importance of export diversification, 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. This variable is multiplied by 100 to reduce the skewness in data and it is adapted from a previous study (Aditya & Acharyya, 2013).

Therefore the aim is to target middle income developing countries for knowing the explanatory power of innovation strategies measured through TCI and patents in estimating the diversified export base of the panel. The interest of this study lies in explaining the impact of innovations strategies upon export diversification. Export diversification in merchandise exports gets its' basis from TCI in the economy. Many developing countries got the foothold from export diversification to jump from lower middle income to upper middle income group for which patents play a crucial role. This also hypothesizes pivotal importance of market size i.e. Gross Domestic Product per capita (GDP) for export diversification. The straightforward explanation gives an evolution to higher TCI value and strategically involving number of patents filed by residents and non-residents in country to view export diversification in middle income countries. The addition of core novel determinants in study can provide meaningful suggestions to policy makers for smooth increase in export diversification. The potential determinants to boost export diversification in middle income countries is a thirst of this study which can embed optimal scenario for economy. Furthermore, the variables like per capita Gross Domestic Product (GDP), Financial Development Index (FD), Gross Capital Formation (GCF), Export Growth (XG) and Trade Openness (TOP) are control variables.

The empirical estimation is based on a panel data set of 65 middle income developing countries spanning the period from 1995 to 2021. The limited sample is due to unavailability of data for many countries. The sample is further divided into categories on the basis of level of development. Panel data analysis is always more informative to comprehend determinants for any underlying phenomenon. Furthermore, splitting sample upon any similar basis gives an optimal guidance to tailor policies for a group of countries. Results are based on Panel Quantile Regression (PQR) i.e. Method of Moments Quantile Regression (MMQR). The estimation for segregation of sample is also done by same method. The rest of the paper is organized in four more sections. Section 2 gives empirical review, section 3 provides data and estimation methods. Results and discussion are provided in section 4 and lastly section 5 concludes the study.

2. Literature Review

Literature in economics deals with export diversification through several aspects. Numerous economic hypothesis exist to test the interdependence of innovations, trade and growth. It remained imperative ever that growth and trade affect each another (Olubiyi, 2014). Initially, the research studies kept focusing on infrastructure related variables, institutional reforms and domestic credit as major determinants of export diversification. Various researchers put their efforts to find the relevant determinants of export diversification in different times (Cieślik & Parteka, 2021; Fosu & Abass, 2020; Gozgor & Can, 2016; Lectard & Rougier, 2018; Mania & Rieber, 2019; Regolo, 2013; Ul-Haq et al., 2025; Zhang & Xiaofeng, 2023).

Patenting portrays output of R and D activity and innovation process (Grupp, 1998). Patenting is a level playing phenomenon of technology field. Patents are the added advantage for economic success in international markets (Amendola et al., 1993; Porter & Porter, 1998; Wakelin, 1998). Historically it was retrieved that patents could better explain streams of exports in high tech sectors (Howitt & Aghion, 1998). However, a time series study elaborated the patents impact on exports for low tech sectors (Blind et al., 2006). Filling patents indicate a blissful invention in the field of technology and patented technology can be sold in market leading to not only price competition but to a quality competition (Kleinknecht et al., 2006; Legler & Krawczyk, 2006; McGregor, 2017; Sweet & Eterovic, 2019).

A study based on Schumpeterian model of innovation pointed out that improved products can increase economic uplift (Howitt & Aghion, 1998). Contextualizing international trade, expansion in global share has a background of price and quality competition which perhaps is a landmark of creative destruction. A positive link between country share of US patents and export performance was observed for 15 years in OECD countries. The explanatory remarks for patents on various export measures i.e. Revealed comparative advantage (RCA), export market share, export to GDP ratio and export import ratio remained similar (Soete & Wyatt, 1983).

Later on, sectoral heterogeneity was observed in another study for similar panel (Soete, 1987). Another stance of bilateral trade was observed for patents and export volume in 9 OECD countries by controlling the effect of relative wage rate and investment intensity (Wakelin, 1998). Investment intensity of a country sustain the growth rates of country. A time series study in Germany made remarkable contribution by exploring the effect of innovative capacity on export volume (Danninger & Joutz, 2008). The patents were used as a proxy of innovative capacity.

Positive correlation of patents and exports was reported for five industrialized countries (Van Hulst et al., 1991). Another cross section study was conducted in china which included a sample of 1111 Chinese firms. The study reported for positive effect of patents filing and new product development on exports (Li & Lin, 2016).

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.

Likewise, another study was conducted in Brazil 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. In the similar vein, trade cost also took an added advantage when it was believed to reduce trade cost to enhance trade activities including export diversification. A few previous studies kept linking trade cost with export diversification along with employing other variables related to logistic infrastructure, which proved significant improvement in export diversification (Bensassi et al., 2015; Fugazza & Hoffmann, 2017; Gani, 2017).

The mainstream international trade economists relied on comparative advantage as a basis of trade between two countries (Ricardo, 1821). The H-O theory is the further testimonial in a way that factor endowment took the stage (Heckscher, 1919; Ohlin, 1933). The empirical settings to test the theoretical front was done on US data. The study was based on the assumption that US should import labour intensive goods and export capital intensive goods; ended with a paradox (Leontief, 1953). Further explanations were advanced as a natural response of paradox. The assumption of H-O model for similar technology stood unrealistic. Besides, deviation from traditional mainstream economist took its hold with the emergence of 'new trade theory', masking the pivotal role of manufacturing produce in an economy (Prebisch, 1962; Singer, 1949). The theory stressed on manufacturing goods production to avoid volatility in terms of trade and achieve the sustainable economic scenario in the economy. Moreover, technological changes remained the base of trade in product cycle model (Cao & Folan, 2012; Posner, 1961; Tyulin & Chursin, 2020). The product cycle model advanced oligopolistic market competition where followers catch up leading technology.

3. Model, Data and Estimation

3.1 Data

A balanced panel of 65 developing countries for the period 1995-2021 is used in this study. The selection of cross sections is confined to middle income countries as full sample, whereas disaggregation is done as LMI and UMI. Table 1 in appendix B illustrate the description, source and units of the variables employed in this study. Table 2 in appendix B provides the list of countries for this study. Before proceeding for estimation, the preliminary findings are reported below:

Table 1. Descriptive statistics

Variables	Mean	SD	Min	Max
Di	69.864	11.967	36.711	93.610
TCI	0.805	0.506	0.093	4.499
PAT	2591.770	6989.389	1.000	59915
FD	0.231	0.131	0.000	0.777
GCF	25.963	12.952	-26.625	172.947
GDP	2.735	4.946	-19.748	81.355
TOP	4.212	0.462	2.750	5.564
XG	4.475	49.346	-467.675	329.054
UMI				
Di	66.464	12.937	36.711	93.610
TCI	0.649	0.368	0.102	4.041
PAT	3780.724	8240.705	1	45517
FD	0.273	0.152	0.000	0.777
GCF	25.515	14.678	1.157	172.947
GDP	2.981	5.917	-19.748	81.355
TOP	4.232	0.453	2.750	5.363
XG	8.513	45.363	-274.734	305.683
LMI				
Di	72.602	10.348	43.630	89.871
TCI	0.927	0.562	0.093	4.499
PAT	1944.079	6697.527	2	59915
FD	0.196	0.097	0.003	0.585
GCF	26.325	11.367	-26.625	69.473
GDP	2.537	3.989	-18.324	19.939
TOP	4.197	0.469	2.794	5.564
XG	1.334	52.042	-467.675	329.053

(Source: Author's compilation.)

Table 1 presents the core statistical properties of variables and correlation analysis. The highest mean value is observed for PAT followed by Di, GCF. XG and TOP respectively for full sample. Lowest mean value is observed for FD for full sample and sub samples. The pattern for highest mean value of PAT followed by GDP, TOP, TCI and Di remains alike for both sub-samples. A few variables including PAT, XG and GDP show highest spread out in the form of standard deviation whereby rest of the variables have less difference of their means from standard deviations in full sample and sub samples. So the data qualifies econometric concerns for underlying MMQR estimation method (Anser et al., 2022). The results of OLS estimation can be biased if variable do not possess the property of normally distributed (Cheng et al., 2021). Moreover, the results of OLS estimation provides partial picture of relationship between dependent and employed explanatory variables (Dietrich & Weber, 2018). To avoid the existence of deviation, quantile regression method instead of OLS method is adopted for estimation in this study. The correlation among variables is presented below:

Table 2. Correlation Analysis

	Di	TCI	PAT	FD	GCF	GDP	TOP	XG
Di	1							
TCI	0.073	1						
PAT	-0.422	-0.054	1					
FD	-0.552	-0.218	0.555	1				
GCF	0.090	-0.220	-0.011	-0.019	1			
GDP	-0.344	-0.312	0.297	0.508	-0.107	1		
TOP	0.034	-0.082	-0.235	-0.108	0.304	-0.149	1	
XG	0.030	0.004	-0.018	-0.060	-0.005	0.000	0.114	1

(Source: Author's compilation)

Table 2 presents the correlation analysis, which provides movement or fluctuation of two series together. Unsurprisingly, correlation is not observed above 0.8 for any two series which confirms no multicollinearity issue in data which again confirms the suitability for estimation (Anser et al., 2022). Indeed, the sample is more than 20 in terms of number of years and cross sections, hence the interconnectedness may remain high among cross sections and alarms the presence of Cross Sectional Dependence (CSD) quite high (Zoundi, 2017).

3.2 Cross Sectional Dependence

Moreover, innovation, exports and trade related variables are macroeconomic variables which are likely affected by common shocks for instance; global technology cycles, commodity price shocks, financial development etc. 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 & Pagan, 1980; Pesaran, 2021).Hence, test for CSD using Pesaran's CD test is a suitable strategy. The CD test is computed from pairwise correlation coefficients of residuals and is valid for panels with large N and T. If the CD statistic rejects the null of cross-section independence for one or more variables, this restricts for using first generation unit root tests and motivates for using second generation unit root tests. The results for CSD are reported in Table 3.

Table 3. Cross Sectional Dependence

Variable	CD-test	p-value	Corr	abs(corr)
Di	10.910	0.000	0.046	0.351
TCI	33.480	0.000	0.148	0.590
PAT	7.630	0.000	0.034	0.452
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)

Standard first-generation panel unit-root tests assume cross-sectional independence. As the CSD exists, those tests produce misleading size and power properties. Pesaran introduced cross-sectionally augmented ADF (CADF) regressions for each cross section that include cross-section averages as additional regressors; averaging individual CADF statistics produces the CIPS statistic for the panel (Pesaran, 2007). Furthermore, CADF and CIPS explicitly account for common factors and are appropriate for panels with cross-section dependence. For the purpose, both the mentioned 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).

3.3 Unit Root Tests

The unit root is applied to the time related data before applying any estimation method. It is applied to check the stationarity of series. It is important to note that series stationary so as to avoid spurious regression. The results are reported in Table 4.

Table 4. Results for Unitroot

	CIPS			CADF		
	Level		First Difference	Level		First Difference
Variables	t-cal	t-tab	t-cal	t-cal	t-tab	t-cal
Di	-2.340	-2.150		-2.340	-2.080	
TCI	-2.270	-2.150		-2.203	-2.080	
PAT	-1.578	-2.150	-3.943	-1.814	-2.080	-3.057
FD	-2.428	-2.150		-2.225	-2.080	
GCF	-2.120	-2.150	-4.465	-2.499	-2.080	
GDP	-3.676	-2.150		-2.749	-2.080	
TOP	-1.701	-2.150	-4.471	-1.816	-2.080	-3.342
XG	-4.048	-2.150		-2.871	-2.080	

(Source: Author's compilation)

Table 4 describes the results for panel unit root obtained through CIPS and CADF. Results against their P-Values suggest that all the variables are stationary at level I(0) except PAT and TOP. Thus, the regression is performed by taking the variables in their appropriate level form.

3.4 Model Specification

The Herfindhal-Hirschman index (HHI) calculated for merchandise exports is used as dependent variable by following a few studies (Elhiraika & Mbate, 2014; Handoyo & Ibrahim, 2021; Oliveira et al., 2020). It is used as a proxy of export diversification Di. The variable TCI indicates an innovation strategy representing the combination of couple of ratios. These two ratios portray the distortions in the country made to put the production frontier towards value added manufacturing. The developing countries adopt this strategy to deviate from relaying upon traditional produce.

Patents are used as a proxy of innovations which are the combined sum of patent filed by residents and non-residents in the economy. The most common explanatory/control variables for boosting export diversification are GDP per capita and extant of openness of the economy.

The significant contribution of this variable is somehow controversial. Perhaps, many studies employed a universal proxy of trade openness i.e. exports plus imports as a ratio of GDP to know its impact on outcome variable (Das, 2017; Kumari & Sharma, 2017; Williams, 2015).

$$Di_{it} = f(, TCI_{it}, PAT_{it}, GCF_{it}, GDP_{it}, TOP_{it}, FD_{it}, XG_{it}) \quad (2)$$

Where i = 1, … ,65 (further divided in sub samples) and t = 1995, … ,2021

3.5 Estimation Method (MMQR)

The standard regression analysis provides estimation for average relationship between independent variable and outcome of response variable. The estimation methods paint the picture for partial view of relationship among variables and appropriate coefficient estimation for real relationship among variables is not addressed. The conventional regression method provides information about mean effect but the information about explanatory variables on different quantiles of response variables remain missing. The novel technique of panel quantile regression in estimating the impact of defying comparative advantage alongside economic and structural variables on export diversification can avoid the limitations of conventional regression technique. Initially the quantile regression was proposed in the paradigm of estimation techniques to capture 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). The equation becomes as under:

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

Given X_{it} (the explanatory variables for export diversification, presented in equation 3 across the conditional quantile distribution of D_{it} can be formulated as

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

Equation-5 represents the τth quantile of the outcome variable D and $\acute{X}_{it}$ is the vector of explanatory variables for each cross section i (country) at time t for quantile τth, whereas β are the coefficients of explanatory variables of quantiles. Quantile regression permits slope of regression line to vary across each quantile so, the conditional quantile regression considering fixed effects can be reported as under

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

α_i shows unobservable individual effects and X is matrix of explanatory variables whereas K stands for quantile index shown as a subscript (τ_K) in equation-6. Solving minimization problem provides estimation of various quantiles which can be shown as

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

Where ω_K stands for kth quantile's weight, T is the time period per cross section and N is

the number of cross sections, $\rho_{\tau K}$ is the piecewise linear quantile loss function.

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

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

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

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

The component $\alpha_i + \delta_i q(\tau)$ shows scalar parameter of cross section i at quantile τ. Z stands for 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;

$$min q_i \sum_i \sum_t \rho_\tau (\hat{R}_{it}(\hat{\delta}_t + \acute{Z}_{it}\hat{\gamma})q) \quad (9)$$

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

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

MMQR results are reported for full sample and both sub-samples in appendix A.

4. Empirical Results

The impact of explanatory variables on outcome variable are reported in tables in appendix A. The higher value of Di[1] refers to export concentration. The tables in appendix A show the separate effect of each innovation strategy in sample countries. Moreover, estimation is done for full sample and sub samples. These results are slightly contradictory from another study (Mania & Rieber, 2019). Additionally, negative coefficient even though insignificant for full sample and sub-samples at many quantiles is unsurprising for those who do not provide very conducive arguments in favor of comparative advantage or in other words do not accomplish 'standard trade theory'. More importantly, magnitude of coefficient is also increasing slightly with same sign (negative). TCI indicates emergence of manufactured products in the basket of merchandise exports with the persuasion to yonder PPF and comparative advantage. These results align with another study (Lectard & Rougier, 2018).

Indeed, higher TCI value exhibits higher manufacturing value added produce adopted by the

[1] The positive sign of coefficients reveals export concentration whereas negative sing portrays export diversification. Henceforth, results will be discussed in reverse form.

country and higher investment in capital-intensive manufacturing sector is made. It is somehow a heavy investment in capital, making the upsurge value added manufacturing to be realized which could not have been generated otherwise. The situation is an obvious indication of government intervention (Bruno et al., 2015). The additive capacity relationship between TCI and export diversification is masking subtle variety in the selected sample of countries to be investigated. Perhaps, the painted relationship may not be valid for all economies and revisiting the idea for specific group of countries or regions may provide a clear picture. Implementing forced transition and reshaping productive capabilities by defying comparative advantage may significantly add the sector oriented exports but the diversification in full export basket is not achieved specifically for LMI. This can further dwell complexity in the distorted sector, the lopsidedness is deemed to prove, and the other side of economy may suffer output loss. It is observed in the results of MMQR that TCI is increasing export diversification at lower quantiles. Indeed, lower quantiles show higher diversification level. Henceforth a mild addition is observed but significance of TCI towards export diversification is an exception.

Adopting TCI and its core impact on export diversification in full sample and sub samples diverts the attention towards dynamic comparative advantage. The theoretical junction stresses the application of 'new trade theory' with a wider policy scope (Fine & Van Waeyenberge, 2013). The peripheral argument also stresses upon productivity enhancement with more employment in manufacturing sector. The economies specifically middle income countries undergo transitional phases and adjust beyond natural comparative advantage (Acharyya & Kar, 2014). Higher trends to adopt TCI make rapid adjustment towards reallocation of local factors of production. This strategy also mitigates terms of trade deterioration. Interventions are the structural requirements for building TCI and inducing regulatory framework provided the bottlenecks are reduced or removed (Cirera & Winters, 2015).

Innovations are the combination of input and output enabling alterations at PPF through newly emerged productive schemes, managerial and business practices. Innovations are a vibrant view of imperfect competition and a reasonable imitation (Linder, 1961). A systematic and schematic linkage can better explain indicators of innovations i.e. input and output indicators separately. Patents filed by residents and non-residents are the suitable proxy of innovations for this study (Bryan & Williams, 2021). It is a comprehensive view of innovations and the same results are also been reported in a similar study (Oliveira et al., 2020). Here, product life cycle theory holds for sample panel of countries indicating that higher pace of innovations have higher probability for diversification in manufacturing goods. These provide capacity to mull over changes in an economy. Theoretically, innovations encompass the restructuring of an economy which entails improvement in products through novelty in production, marketing and business practices.

Innovations reconsider relation with external environment so as to closely connect the phenomenon with knowledge, learning and production frontier. Innovation strategies have forward and backward linkages which can easily be translated into the input and output indicators of innovations. It is unfortunate that data on input and output indicators of

innovations in developing countries is scanty. The prominent input indicator is R & D indicator which is restricted to be used due to unavailability of data whereby the output indicators are patents, trademarks, and scientific and technical publications which are quantifiable in the form of numbers. Furthermore, innovations theorize a system of institutions and organizations.

The middle income countries are sometimes not acquiring well established financial markets and financial development remains a constraint to improve and diversify export basket. These results are in favour of LMI but UMI are the exceptions. GCF is a proxy of capital formation which is significantly increasing export diversification for full sample and the results are in line with another study (Liaqat, 2019). More open economies are more tilted towards export diversification for all samples which indicates that the free trade paves the way for export diversification. These results are alike with another study (Martincus & Carballo, 2008). XG is also significantly increasing export diversification in a sub sample of LMI. Higher XG indicates that traditional trade theory is the building block towards new trade theory.

Market size is also significantly increasing export diversification for UMI which suggests that higher market size has higher probability to diversify exports bundle and the results are in line with another study (Elhiraika & Mbate, 2014; Gnangnon, 2021). Open economies are also increasing export diversification for all samples which suggests that opening exports and imports under free trade can improve diversification in exports. Both variables enhance import of capital content to increase production of manufacturing goods and the diversifying impact on exports remain intact. Significant impact of GDP per capita and trade openness goes in favour of more open economies and higher market size which are the propelling elements to increase export diversification. The argument goes in favour of domestic market. Often, countries produce those commodities in larger quantity for which they have higher domestic demand (Ross, 2019).

5. Conclusions and Policy Suggestions

Export diversification and TCI appeared as an alternative of import substitution policies in recent past, which can further formulate policies designed to put the economy on path of trade and development. TCI is found to be adding in export diversification in this research study. The results are confirmed for the panel of 65 middle income developing countries further divided into sub-samples over the period 1995-2021 through MMQR. The MMQR acquires the endogeneity and heterogeneity expounding efficiency in panel data. However, the results cannot provide a general stance to each economy used as a sample in this research study. Undoubtedly, the proposition can help in devising policies feasibly suitable to contextualize developing countries. Policies should tilt in favor of aligning with endowed factor at first, in the country for exports and then further broadening of canvass can be addressed to diversify the export basket. Furthermore, innovations are also captured through patents filed by residents and nonresidents cumulatively in the economy did support export diversification for various quantiles in full sample and sub samples. The patents filed relate to the new investment projects. It may dive into a paramount reasoning that investors in sample countries focus on patenting through aligning their efforts to provide unique product. The

products addition may remain handful but their stance to improve through legal arrangement of filing patents add in the patenting activity which plays a crucial role in shaping export diversification. Perhaps, the inflexibility to increase export diversification through diversified investment avenues is also not sparse in these countries. The varying degree of industrialization might have affected the results at some quantiles but a blossoming picture of diversification in exports is seen for selected sample of countries.

Authors contributions

Ramsha Saleem conceived the idea and shaped its relevance with the middle-income countries. She did a detailed literature review to find the significant research gap to analyze it aptly. After estimation results and discussions are thoroughly made to lead topic towards policy suggestions. Dr. Puah Chin Hong administered the research manuscript and wrote policy suggestions. Dr. Jerome did the editing. Dr. Azhar helped in estimation of the model.

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Appendix: A

Table 1. Result of MMQR for Full Sample: Impact of (TCI)

			Quantiles										
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
TCI	-1.197*** (0.412)	-1.451*** (0.259)	1.958** (0.774)	1.026 (0.637)	0.251 (0.533)	-0.335 (0.471)	-0.835* (0.432)	-1.279*** (0.411)	-1.803*** (0.404)	-2.234*** (0.414)	-2.746*** (0.443)	-3.378*** (0.504)	-4.090*** (0.587)
FD	-50.942*** (2.112)	4.868*** (1.325)	-61.527*** (3.947)	-58.400*** (3.248)	-55.799*** (2.728)	-53.833*** (2.410)	-52.156*** (2.211)	-50.668*** (2.100)	-48.908*** (2.065)	-47.462*** (2.119)	-45.743*** (2.269	-43.622*** (2.573)	-41.235*** (3.001)
GCF	0.035 (0.026)	-0.009 (0.017)	0.055 (0.049)	0.049 (0.040)	0.045 (0.034)	0.041 (0.030)	0.038 (0.028)	0.035 (0.026)	0.031 (0.026)	0.029 (0.026)	0.025 (0.028)	0.021 (0.032)	0.017 (0.037)
GDP	-0.164*** (0.053)	-0.013 (0.033)	-0.135 (0.099)	-0.143* (0.082)	-0.150** (0.069)	-0.156** (0.061)	-0.160*** (0.056)	-0.164*** (0.053)	-0.169*** (0.052)	-0.173*** (0.053)	-0.178*** (0.057)	-0.184*** (0.065)	-0.190** (0.076)
TOP	-0.652 (0.579)	0.746** (0.363)	-2.274** (1.078)	-1.795** (0.888)	-1.396* (0.747)	-1.095* (0.661)	-0.838 (0.605)	-0.610 (0.575)	-0.340 (0.565)	-0.119 (0.580)	0.145 (0.622)	0.470 (0.704)	0.835 (0.822)
XG	0.004 (0.006)	-0.010*** (0.004)	0.026** (0.011)	0.019** (0.009)	0.014* (0.007)	0.010 (0.007)	0.006 (0.006)	0.003 (0.006)	0.000 (0.006)	-0.003 (0.006)	-0.007 (0.006)	-0.011 (0.007)	-0.016** (0.008)
C	84.849*** (2.599)	4.851*** (1.631)	74.303*** (4.845)	77.419*** (3.987)	80.010*** (3.358)	81.969*** (2.968)	83.640*** (2.720)	85.123*** (2.583)	86.876*** (2.540)	88.317*** (2.606)	90.030*** (2.794)	92.143*** (3.161)	94.521*** (3.695)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Table 2. Result of MMQR for UMI: Impact of (TCI)

			Quantiles										
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
TCI	-3.059** (1.282)	1.349* (0.809)	-5.987** (2.371)	-5.133*** (1.952)	-4.483*** (1.670)	-3.916*** (1.469)	-3.419** (1.340)	-3.019** (1.278)	-2.647** (1.259	-2.184* (1.291)	-1.649 (1.395)	-1.000 (1.603)	-0.426 (1.836)
FD	-45.387*** (2.991)	7.274*** (1.887)	-61.176*** (5.618)	-56.572*** (4.589)	-53.068*** (3.903)	-50.009*** (3.429)	-47.330*** (3.134)	-45.175*** (2.986)	-43.166*** (2.948)	-40.670*** (3.030)	-37.789*** (3.264)	-34.290*** (3.762)	-31.192*** (4.302)
GCF	0.002 (0.070)	0.044 (0.044)	-0.094 (0.130)	-0.066 (0.107)	-0.044 (0.092)	-0.026 (0.081)	-0.009 (0.073)	0.004 (0.070)	0.016 (0.069)	0.031 (0.071)	0.049 (0.076)	0.070 (0.088)	0.089 (0.101)
GDP	-0.212*** (0.064)	-0.043 (0.040)	-0.119 (0.117)	-0.146 (0.097)	-0.166** (0.083)	-0.184** (0.073)	-0.200*** (0.066)	-0.213*** (0.063)	-0.225*** (0.062)	-0.239*** (0.064)	-0.256*** (0.069)	-0.277*** (0.079)	-0.295*** (0.091)
TOP	1.322 (1.021)	2.870*** (0.644)	-4.908** (1.927)	-3.091** (1.570)	-1.709 (1.333)	-0.502 (1.171)	0.555 (1.071)	1.406 (1.020)	2.198** (1.007)	3.183*** (1.036)	4.320*** (1.115)	5.701*** (1.287)	6.923*** (1.471)
XG	0.032*** (0.008)	-0.007 (0.005)	0.047*** (0.014)	0.043*** (0.012)	0.039*** (0.010)	0.036*** (0.009)	0.034*** (0.008)	0.032*** (0.008)	0.030*** (0.007)	0.028*** (0.008)	0.025*** (0.008)	0.022** (0.009)	0.019* (0.011)
C	75.849*** (4.339)	-8.063*** (2.737)	93.351*** (8.102)	88.247*** (6.638)	84.363*** (5.656)	80.972*** (4.971)	78.003*** (4.541)	75.614*** (4.327)	73.387*** (4.269)	70.620*** (4.387)	67.427*** (4.729)	63.548*** (5.444)	60.114*** (6.223)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Table 3. Result of MMQR for LMI: Impact of (TCI)

	Quantiles												
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
TCI	-1.836*** (0.536)	-2.226*** (0.368)	3.200*** (1.194)	1.612* (0.964)	0.366 (0.770)	-0.604 (0.651)	-1.289** (0.584)	-2.159*** (0.521)	-2.821*** (0.487)	-3.516*** (0.482)	-4.206*** (0.499)	-5.177*** (0.571)	-6.008*** (0.660)
FD	-53.235*** (3.716)	1.968 (2.548)	-57.686*** (8.171)	-56.283*** (6.550)	-55.181*** (5.364)	-54.324*** (4.540)	-53.718*** (4.042)	-52.949*** (3.562)	-52.364*** (3.352)	-51.749*** (3.309)	-51.139*** (3.452)	-50.281*** (3.923)	-49.547*** (4.509)
GCF	0.001 (0.030)	-0.032 (0.021)	0.073 (0.067)	0.050 (0.053)	0.033 (0.044)	0.019 (0.037)	0.009 (0.033)	-0.004 (0.029)	-0.013 (0.027)	-0.023 (0.027)	-0.033 (0.028)	-0.047 (0.032)	-0.059 (0.037)
GDP	-0.038 (0.095)	-0.009 (0.065)	-0.017 (0.208)	-0.024 (0.167)	-0.029 (0.137)	-0.033 (0.116)	-0.036 (0.103)	-0.040 (0.091)	-0.042 (0.085)	-0.045 (0.084)	-0.048 (0.088)	-0.052 (0.100)	-0.056 (0.115)
TOP	-1.882** (0.765)	-0.738 (0.525)	-0.212 (1.684)	-0.739 (1.350)	-1.152 (1.105)	-1.473 (0.935)	-1.700** (0.833)	-1.989*** (0.734)	-2.208*** (0.691)	-2.439*** (0.682)	-2.668*** (0.711)	-2.989*** (0.808)	-3.265*** (0.929)
XG	-0.010 (0.007)	-0.009* (0.005)	0.010 (0.016)	0.004 (0.013)	-0.001 (0.010)	-0.005 (0.009)	-0.008 (0.008)	-0.012* (0.007)	-0.014** (0.006)	-0.017*** (0.006)	-0.020*** (0.007)	-0.024*** (0.008)	-0.027*** (0.009)
C	92.530*** (3.663)	12.859*** (2.512)	63.437*** (8.130)	72.611*** (6.543)	79.808*** (5.277)	85.413*** (4.463)	89.372*** (3.994)	94.398*** (3.546)	98.223*** (3.320)	102.237*** (3.282)	106.225*** (3.409)	111.835*** (3.894)	116.634*** (4.497)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Table 4. Result of MMQR for Full Sample: Impact of (PAT)

	Quantiles												
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
PAT	-0.000*** (0.000)	0.000 * (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 *** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 *** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.002** (0.000)	-0.002* (0.000)
FD	-44.091*** (2.563)	6.460*** (1.572)	-57.225*** (4.426)	-54.523*** (3.908)	-50.700*** (3.256)	-48.034*** (2.889)	-45.937*** (2.678)	-43.920*** (2.563)	-41.687*** (2.542)	-39.334*** (2.636)	-36.876*** (2.848)	-34.516*** (3.154)	-31.491*** (3.678)
GCF	0.075*** (0.025)	-0.026* (0.016)	0.128*** (0.044)	0.117*** (0.039)	0.101*** (0.032)	0.090*** (0.029)	0.082*** (0.026)	0.074*** (0.025)	0.065*** (0.025)	0.055** (0.026)	0.045 (0.028)	0.036 (0.031)	0.024 (0.036)
GDP	-0.149*** (0.0523)	-0.004 (0.032)	-0.141 (0.090)	-0.142* (0.080)	-0.144** (0.066)	-0.146** (0.059)	-0.147*** (0.055)	-0.148*** (0.052)	-0.149*** (0.052)	-0.150*** (0.054)	-0.152*** (0.058)	-0.153** (0.064)	-0.155** (0.074)
TOP	-2.006*** (0.574)	1.747*** (0.352)	-5.559*** (0.991)	-4.828*** (0.876)	-3.794*** (0.730)	-3.073*** (0.647)	-2.506*** (0.600)	-1.960*** (0.575)	-1.356** (0.570)	-0.720 (0.591)	-0.055 (0.638)	0.584 (0.706)	1.402* (0.827)
XG	0.003 (0.005)	-0.009*** (0.003)	0.022** (0.009)	0.018** (0.008)	0.013* (0.007)	0.009 (0.006)	0.006 (0.006)	0.003 (0.005)	0.000 (0.005)	-0.003 (0.005)	-0.007 (0.006)	-0.010 (0.007)	-0.014* (0.008)
C	87.387*** 2.367	-0.577 (1.452)	88.560*** (4.085)	88.319*** (3.604)	87.978*** (3.001)	87.739*** (2.665)	87.552*** (2.472	87.372*** (2.361)	87.172*** (2.337)	86.962*** (2.426)	86.743*** (2.632)	86.532*** (2.915)	86.262*** (3.369)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Table 5. Result of MMQR for UMI: Impact of (PAT)

			Quantiles										
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
PAT	0.000* (0.000)	0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.000** (0.000)	-0.001 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
FD	-38.926*** (4.064)	1.763 (2.534)	-42.330*** (6.887)	-41.749*** (6.219)	-41.024*** (5.464)	-40.164*** (4.712)	-39.345*** (4.212)	-38.806*** (4.038)	-38.361*** (4.004)	-37.769*** (4.116)	-37.081*** (4.451)	-36.245*** (5.093)	-35.307*** (6.020)
GCF	0.212** (0.083)	0.054 (0.052)	0.107 (0.141)	0.125 (0.127)	0.147 (0.112)	0.174* 0.097)	0.199** (0.086)	0.215*** (0.083)	0.229*** (0.082)	0.247*** (0.084)	0.268*** (0.091)	0.294*** (0.104)	0.323*** (0.123)
GDP	-0.207*** (0.069)	-0.077** (0.043)	-0.059 (0.118)	-0.084 (0.106)	-0.116 (0.093)	-0.153* (0.081)	-0.189*** (0.072)	-0.212*** (0.069)	-0.231*** (0.068)	-0.257*** (0.070)	-0.287*** (0.076)	-0.323*** (0.087)	-0.364*** (0.103)
TOP	-2.727** (1.117)	4.579*** (0.697)	-11.566*** (2.039)	-10.057*** (1.678)	-8.175*** (1.496)	-5.942*** (1.329)	-3.816*** (1.187)	-2.416** (1.112)	-1.260 (1.108)	0.277 (1.151)	2.063* (1.233)	4.235*** (1.418)	6.671*** (1.674)
XG	0.020 (0.013)	-0.015** (0.008)	0.050** (0.021)	0.045** (0.019)	0.038** (0.017)	0.031** (0.015)	0.024*** (0.013)	0.019 (0.012)	0.015 (0.012)	0.010 (0.013)	0.004 (0.014)	-0.004 (0.016)	-0.012 (0.019)
C	84.437*** (4.351)	-13.186*** (2.713)	109.889*** (7.722)	105.545*** (6.558)	100.126*** (5.826)	93.695*** (5.128)	87.573*** (4.577)	83.542*** (4.321)	80.213*** (4.298)	75.789*** (4.453)	70.645*** (4.785)	64.390*** (5.488)	57.378*** (6.474)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Table 6. Result of MMQR for LMI: Impact of (PAT)

Quantiles													
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
PAT	-0.000*** (0.000)	0.000 * (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.001 *** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001 *** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.002** (0.000)	-0.002* (0.000)
FD	-46.091*** (2.663)	6.560*** (1.672)	-57.225*** (4.426)	-54.523*** (3.908)	-50.700*** (3.206)	-58.034*** (2.819)	-55.937*** (2.678)	-53.920*** (2.543)	-49.687*** (2.542)	-45.334*** (2.636)	-36.876*** (2.848)	-34.516*** (3.154)	-31.491*** (3.678)
GCF	0.075*** (0.035)	-0.036* (0.014)	0.128*** (0.044)	0.127*** (0.039)	0.121*** (0.032)	0.098*** (0.029)	0.092*** (0.028)	0.084*** (0.027)	0.065*** (0.025)	0.055** (0.029)	0.049 (0.028)	0.039 (0.031)	0.026 (0.036)
GDP	-0.159*** (0.053)	-0.006 (0.033)	-0.141 (0.090)	-0.142* (0.081)	-0.144** (0.067)	-0.145** (0.059)	-0.147*** (0.056)	-0.149*** (0.052)	-0.150*** (0.052)	-0.152*** (0.055)	-0.168*** (0.058)	-0.163** (0.065)	-0.156** (0.075)
TOP	-2.016*** (0.576)	1.757*** (0.354)	-5.569*** (0.991)	-4.898*** (0.876)	-3.994*** (0.730)	-3.173*** (0.647)	-2.806*** (0.630)	-1.960*** (0.575)	-1.756** (0.574)	-0.720 (0.591)	-0.055 (0.648)	0.584 (0.726)	1.402* (0.827)
XG	0.015 (0.005)	-0.013*** (0.013)	0.025** (0.019)	0.029** (0.018)	0.023* (0.017)	0.029 (0.016)	0.026 (0.009)	0.013 (0.008)	0.009 (0.006)	-0.008 (0.006)	-0.007 (0.008)	-0.010 (0.007)	-0.014* (0.008)
C	87.466*** 2.487	-0.581 (1.454)	88.560*** (4.085)	88.319*** (3.604)	87.978*** (3.071)	87.429*** (2.665)	87.562*** (2.572	87.312*** (2.381)	87.102*** (2.367)	85.822*** (2.456)	86.743*** (2.642)	86.632*** (2.945)	86.392*** (3.389)
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1													

(Source: Author's compilation.)

Appendix: B

Table 1. Definition, Measurement Units and Source of Data used in the analysis

Variable	Variable Description	Definition	Units	Source
Di=HHI	Export Diversification	Herfindahl-Hirschman Index	Normalized between 0 and 1	UNCTAD 2022
PAT	Patents	Filed by residents, non-residents	Number	WDI 2022
GDP	Gross Domestic Product	Total value added of Gross Domestic Product	Constant US Dollars	WDI 2022
VAM	Manufacturing value added	Industries belonging to ISIC division 15-37	Current US Dollars	WDI 2022
L	Labor force	Total working labor above age 15	Number	WDI 2022
Lm	Labor Force in Manufacturing	Number of Labor involved in manufacturing	Number	WDI 2022
TOP	Trade Openness	Total Exports plus Imports as ratio of GDP	Index	WDI 2022
XG	Export Growth	Exports of goods and services	(annual % growth)	WDI 2022
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

(Source: Author's compilation.)

Table 2. List of countries

Lower-Middle Income (LMI)	Upper-Middle Income (UMI)
Algeria	Albania
Angola	Argentina
Bangladesh	Armenia
Bhutan	Azerbaijan
Bolivia	Belarus
Cabo Verde	Bosnia and Herzegovina
Cambodia	Botswana
Congo, Dem. Rep.	Brazil
Egypt, Arab Rep.	Bulgaria
El Salvador	Colombia
Ghana	Costa Rica
Haiti	Dominican Republic
Honduras	Ecuador
India	Georgia
Indonesia	Guatemala
Iran, Islamic Rep.	Guyana
Kenya	Jamaica
Kyrgyz Republic	Jordan
Lao PDR	Kazakhstan

Mongolia	Lebanon
Morocco	Mexico
Nepal	Paraguay
Nicaragua	Peru
Nigeria	Russian Federation
Pakistan	South Africa
Papua New Guinea	Thailand
Philippines	Tonga
Samoa	Turkiye
Sri Lanka	Turkmenistan
Tanzania	
Tunisia	
Ukraine	
Uzbekistan	
Vietnam	
Zambia	
Zimbabwe	

(Source: Author's compilation.)