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Classification of Specialty Product/S Exports & Their Impact on GDP Per Capita Growth

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This study investigates about the significance of exports of specialty product/s as a factor affecting the level of GDP per capita growth. Specialty exports have three categories namely 'Low Technology Manufacturing Specialty products', High Technology Knowledge Intensive products and Natural Specialty Products. Impact of Specialty exports on GDP per capita growth is analyzed using three panels from 1983 to 2017; first panel is of all the developing countries of the world, then two panels of all developed countries a)- Panel II of developed countries having major export share of knowledge intensive Specialty Product, b)- Panel III of developed countries having major export share of some Natural Specialty Products like metals and metallic ores, crude oil, vegetables, fruits, Gems, petroleum and petroleum products. Then the results of all three panels are compared for policy recommendations.

Keywords: 1- *Specialty Product:* Item that is worldwide popular, extra ordinary or unique enough to motivate people to make an unusual effort to get it (Case of Japanese Vehicles) & constitute at least 10% of total exports.

2- Knowledge Intensive Products: Knowledge intensive products belong to an industry where the workers need a lot of education, skill and experience to work efficiently.

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Introduction

Economists have observed that abundant natural resources, high volumes of exports, long life expectancy rate, and higher investments (domestic and foreign) have positive effect on GDP per capita growth of any country. Previously, economists had used high volume of exports as a core determinant of growth having positive impact on GDP per capita growth; in this paper export of specialty product/s is incorporated in the growth model as a new variable. In modern era, the concept of 'specialization' in production is in competition with the phenomena of "knowledge intensive products", and, highly educated workforce is required for the production of knowledge intensive goods and services. So, in this study, specialty products are split into three broad categories: (i) – Natural Specialty, (ii) – Manufacturing Skill Specialty (excluding High technology manufactured products) (iii) – Knowledge intensive specialty (including High technology Products).

This study used three separate panels and results showed that 43 developing countries included in penal-I, have a positive impact of manufacturing and natural specialty products on GDP per Capita growth. But that impact is not as strong as the impact of knowledge intensive exports of 37 developed countries included in penal-II. Then, the positive impact of natural specialty exports of 20 high income Percapita countries on their GDP per capita included in penal-III is the strongest of all.

2. Literature Review

Looking for the prime factors affecting the real GDP per capita growth of 100 selected countries, *Barro* (1996) conducted a study that used a panel of those 100 countries for a period of 1960 – 1990. He proposed that Growth rate of real per capita GDP depends upon the maintenance of the rule of law, longer life expectancy, more male secondary and higher levels of schooling, lower fertility rates, low government consumption expenditures, higher levels of investment, the level of democracy, a lower inflation rate, and international openness. Barro advocated the theory of convergence, countries having high per capita income have low growth rates, while countries having low per capita income have high growth rates. Barro in his study used penal of 100 countries but very few developing countries were included in that study because of non availability of reliable data on variables. That was a problem of past, these days a lot of secondary data on those variables can be located through reliable sources.

Rifat Baris Tekin (2012) in her paper applied the Granger Causality test to investigate the causality between GDP, exports and foreign direct investment inflows in least developed countries. The data used in the study consisted of 18 least developed countries from 1970 to 2009. *Rifat* found the only manufacturing country in the selected sample was Haiti where export led growth hypothesis proved to be valid. This shows that if a developing country has some manufactured products in its exports list it can achieve rapid growth. *Rifat* found the evidence in support of export led growth hypothesis only for two manufacturing exporter countries Rwanda and Haiti. This suggests that even for LDC's manufacturing exports have positive impact on economic growth. Primary exports do not contribute much in growth and development.

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Chia Yee Ee (2016) conducted a study to check the validity of export-led growth hypothesis. He used a penal of few selected Sub Saharan African countries for a period of 1985 to 2014. He used dynamic ordinary least square and fully modified least square techniques after the panel unit root test for the data. Empirical results prove that there exist a positive impact of investment, government expenditures and exports on economic growth. *Chia* concluded that export led growth hypothesis is valid in case of sub Saharan African countries, although Africa consists of the poorest countries of the world. Once it has been proven that exports have positive impact on economic growth, now an economy has to decide what sort of products it must produce and export. *National Science Board* in *Science and Engineering Indicators (2018)* mention that China is world's largest exporter of Knowledge and technology intensive products (24% of global exports of knowledge intensive goods). Knowledge intensive products include Communications and semiconductors, Computers and office machinery, Pharmaceuticals, Motor vehicles and parts, Chemicals, Electrical machinery and appliances, Machinery and equipment, Railroad and other transportation equipments etc.

Parash Upreti (2015) conducted a study to analyze the prime factors behind the economic growth of developing countries. He used the cross country data, of 76 low income and lower middle income countries for 1995, 2000, 2005 and 2010. *Parash* used multiple regression technique to test the relationship between economic growth and its various determinants. *Parash* started his study with a sample of 76 countries, due to non availability of data on some variables and for some selected countries, that study was limited to 57 countries in 2010, 48 in 2000 and 59 for 2005. Even for 1995, sample size was limited to 16, which was very low sample size. *Parash* limited his study to developing countries, although he mentioned in his paper that same study could be done for developed countries. So, now is the time to conduct the same study for two different panels, one consisting of developed countries and other consisting of developing country.

Crespo Cuaresma and Worz (2005), Hausmann et.al (2007), Berg et. al (2012) and Poncet & Jarreau (2012). These researchers believe that the countries exporting manufactured particularly high technology products are benefited by the positive externalities like knowledge spillovers and efficient management and economies of scale; as a result their economies grow faster than those who are exporting just primary products. So, amongst various determinants of GDP per capita growth, 'Export of knowledge intensive products' is the variable to be explored further.

3. Research Methodology

This study is based on panel data estimation technique, where three separate panels of quite a similar model from 1983 to 2017 were constructed. Panel-I in this study consists of all countries of the world having GNI Percapita between a range of < 1005 US$ to 3,955 US$ (low and lower middle income group). Countries belonging to Penal-I are those which are exporting their manufactured specialty products. Whereas, Penal-II of this study includes all countries of the world having major share of Knowledge intensive products (medium and high tech products) in their export list and having GNI per capita between a range of 3,956 US$ to 12,235 US$ and above (Upper middle income and high income group). Penal-III of this study includes all countries of the

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world having major share of some natural specialty product (e .g Minerals, petroleum products, crude oil, fish, meat, Gold and Gems etc) in their export list and having GNI per capita between a range of 3,956 US$ to 12,235 US$ and above (Upper middle income and high income group).

The proposed model for Panel-I is as follows:

$$GDP\ PER\ CAPITA\ GROWTH_{it} = f\ (MARKET\ SIZE_{it},\ SPEC\ EXPORTS_{it},\ EDU_{it},\ LIFE_{it},\ AID_{it},\ RESOURCE_{it},\ G_{it},\ INVST_{it},\ POPUGR_{it},\ INFL_{it})$$

Where subscript 'i' refers to the various countries : i=1,2,3,4,5,…..N and subscript 't' refers to time i.e year: t=1,2,3,4,5,…..,T.

The proposed model for Panel-II and Penal -III is as follows:

$$GDP\ PER\ CAPITA\ GROWTH_{it} = f\ (MARKET\ SIZE_{it},\ SPEC\ EXPORTS_{it},\ EDU_{it},\ RESOURCE_{it},\ LIFE_{it},\ INVST_{it},\ FDI_{it},\ G_{it},\ POPUGR_{it},\ INFL_{it})$$

Above model does not include AID (foreign aid) because both Penal-II and III are for developed high income per capita countries, which do not receive any development assistance, rather they provide aid to developing countries.

Table 3.1: Variables and their descriptions

Sr #	Variables	Description	Choice of Measures
1	***GDP PER CAPIT GROWTH***	GDP per capita Growth	GDP per capita Growth- (Annual %)
2	***MARKET SIZE***	GDP in the tested year	GDP in the tested year (Measured in constant 2010 US$)
3	***SPEC EXPORTS***	Specialty Exports	Merchandise Exports (Current US $)
4	***EDU***	Education	Govt. expenditures on Education (% of Govt. Expenditures)
5	***RESOURCE***	Natural resources	Natural resources rents measured (as % of GDP)
6	***AID***	Foreign Aid	Net official development Aid received (in current US $)
7	***LIFE***	Life expectancy	Life expectancy at birth (in years)
8	***INVST***	Investment in the tested year	Total Investment in tested year (as % of GDP)

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9	***FDI***	Foreign Direct investment	FDI inflows (as % of GDP)
10	**G**	Govt. Consumption Expenditures	General government consumption expenditure (constant 2010 US$)
11	POPUGR	Population Growth Rate	Population Growth Rate (annual %)
12	INFL	Inflation Rate	Inflation Rate, Consumer Prices (annual %)

Numerical data which is used in the research model is obtained from World Development Indicators (2019).

First test applied on data was Dickey Fuller (ADF)-Fisher Chi Square test. Levin Lin & Chu test, IM Pesaran and Shin W. test and PP-Fisher Chi square tests were also performed to check the Stationarity. GDP per capita growth depends upon a number of factors. Macro economic factors and variables are usually interdependent; variation in one economic variable may have impact on other economic variables over the time. One thing is worth mentioning, this change in other variable is not reflected immediately rather it gradually distributes over future time periods. So Autoregressive Distributed lags (ARDL) modeling is the best choice in this case. Autoregressive Distribute Lags model effectively handles the problem of distributed lags. After the estimation of ARDL model, Wald test was run to see if all the explanatory variables included in the model are significant or not.

4. Model Estimation, Analysis & Interpretations

4.1.1 – Work file Statistics of Penal I:

Workfile Statistics
Date: 08/31/19 Time: 09:54
Name: PANEL-I
Number of pages: 1

Page: Penal-I
Workfile structure: Panel - Annual
Indices: COUNTRY x DATEID
Panel dimension: 43 x 35
Range: 1983 2017 x 43 -- 1505 obs

Object	Count	Data Points
series	14	21070
coef	1	750
Total	15	21820

Table 4.1.2 ARDL Penal-I:

Dependent Variable: D(GDPPCG)
Method: ARDL
Date: 08/23/19 Time: 10:10

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Sample: 1985 2017
Included observations: 1409
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LMS LSPEC_EXP LEDU LLIFE LAID LRESOURCE LG LINVST POPUGR INFL
Fixed regressors: C
Number of models evalulated: 4
Selected Model: ARDL(2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
LMS	0.171455	0.039640	4.325321	0.0000
LSPEC_EXP	0.065674	0.015790	4.159347	0.0000
LEDU	0.018545	0.006572	2.821824	0.0050
LLIFE	-1.759253	0.176565	-9.963771	0.0000
LAID	-0.056126	0.015351	-3.656156	0.0003
LRESOURCE	-0.006721	0.001123	-5.985716	0.0000
LG	-0.023187	0.012330	-1.880534	0.0606
LINVST	-0.001931	0.000630	-3.067738	0.0023
POPUGR	-0.942892	0.022380	-42.13066	0.0000
INFL	0.000354	5.61E-05	6.319673	0.0000
	Short Run Equation			
COINTEQ01	-0.464082	0.072340	-6.415254	0.0000
D(GDPPCG(-1))	0.005050	0.003918	1.289094	0.1980
D(LMS)	99.87079	0.898886	111.1050	0.0000
D(LMS(-1))	-56.08229	7.205715	-7.783030	0.0000
D(LSPEC_EXP)	-0.111089	0.085072	-1.305813	0.1922
D(LSPEC_EXP(-1))	0.043532	0.080220	0.542659	0.5876
D(LEDU)	0.178520	0.121061	1.474624	0.1409
D(LEDU(-1))	-0.037331	0.128198	-0.291194	0.7710
D(LLIFE)	-198.6821	157.7468	-1.259500	0.2084
D(LLIFE(-1))	190.2619	161.0643	1.181279	0.2381
D(LAID)	0.165995	0.088262	1.880707	0.0606
D(LAID(-1))	0.115401	0.058922	1.958531	0.0507
D(LRESOURCE)	0.031768	0.015246	2.083627	0.0377
D(LRESOURCE(-1))	0.005609	0.020141	0.278491	0.7808
D(LG)	-0.030665	0.161610	-0.189745	0.8496
D(LG(-1))	-0.124198	0.147190	-0.843792	0.3992
D(LINVST)	0.001019	0.004069	0.250392	0.8024
D(LINVST(-1))	0.008747	0.007880	1.109984	0.2675
D(POPUGR)	-0.014284	1.948246	-0.007332	0.9942
D(POPUGR(-1))	1.165472	2.757849	0.422602	0.6728
D(INFL)	-0.010021	0.005421	-1.848421	0.0651
D(INFL(-1))	0.005228	0.009307	0.561693	0.5746
C	1.735940	0.261234	6.645159	0.0000

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Mean dependent var	0.080640	S.D. dependent var	5.701174
S.E. of regression	0.345702	Akaike info criterion	-1.455601
Sum squared resid	59.99397	Schwarz criterion	2.081090
Log likelihood	2091.429	Hannan-Quinn criter.	-0.138100

*Note: p-values and any subsequent tests do not account for model selection.

First independent variable in long run equation is "LMS", log(Market size). GDP of the tested year serves as market size proxy. Value of coefficient is 0.171455 which shows that along with 100% change in market size, GDP per capita growth will increase by 17%.

Second independent variable is "LSPEC_EXP", log(specialty product exports). Value of coefficient is 0.065674, which depicts that if exports of specialty products could be increased by 100%, the growth rate of GDP per capita will rise by 6.5674%. Although specialty exports have a positive impact on GDP per capita of developing countries but the impact is neither very strong nor too small to be neglected.

"LEDU", log (Education) is next explanatory variable in long run equation with coefficient value equal to 0.018545. Here annual Govt. expenditures on education are taken as a proxy. As per the value of long run coefficient, if govt. expenditures on education are increased by 100%, GDP per capita will increase by 1.8545%. In developing countries, increasing educational facilities end up increase in educated work force along with increase in employment opportunities. Which in turn have a positive effect on GDP per capita growth rate of the country.

"LLIFE". Log(life Expectancy), is fourth explanatory variable in long run equation. Its coefficient has a negative sign which shows that along with 1% rise in life expectancy, GDP per capita growth rate declines by 1.759253%. In developing countries where population growth rate is already high, if life expectancy increases, it off sets the growth of GDP per capita.

Fifth independent variable in long run ARDL equation is "LAID", log(foreign aid), which is Net official development Aid received by the country. Value of its coefficient is -0.056126. which tells that along with 100% increase in foreign development assistance, GDP per capita growth will decline by 5.6126%. Developing country receives foreign aid in case of economic instability and it shows that recipient country is dependent on others. So, foreign developmental aid can be interpreted as negatively related with GDP per capita growth.

"LRESOURCE", log(resource) is measured by using annual natural resources rent. Most of the developing countries have to spend a lot on exploitation of natural resources. So this variable is negatively related with GDP per capita growth. Although, its negative impact on GDP is negligible. Value of the coefficient of LRESOURCE is -0.006721 which shows that with 100% increase in natural resources rent, GDP per capita growth will decline by 0.6721%.

Next variable in long run equation of ARDL is "LG", log(govt. expenditures). These are non developmental annual expenditures of Government. Value of its coefficient is -0.023187,

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which shows along with 100% rise in Govt. consumption expenditures, GDP per capita growth will fall by 2.3187%. Yet this variable does not occupy a significant status in log run equation.

At eighth place in the long run equation comes the variable "INVST", (annual investment).The value of coefficient of investment is -0.001931, which says that with 100% increase in investment, GDP per capita growth will decline by 0.1931%. So the investment in developing countries is not helping long run increase in GDP per capita as per the ARDL results. This may be due to the corruption and political instability prevailing in most of the developing countries.

Next explanatory variable of long run equation is "POPUGR", (population growth rate). Value of its coefficient is -0.942892, which shows that along with 10% increase in population growth rate, GDP per capita will decline by 9.42892 % (nearly a one to one negative impact). Population growth rate in most of the developing countries stays very high as compared to growth of GDP that's why it off sets the rise in total GDP. And it has a negative impact on GDP per capita growth.

Last variable in long run ARDL equation for panel I is "INFL", (inflation rate). Value of its coefficient is 0.00354. It means with 10% increase in inflation rate, GDP per capita growth in long run will increase by 0.0354%.

Results of short run ARDL equation can also be seen in lower segment of table 4.1.2 Growth is much a matter of log run. So this study is much focused on long run analysis of variables and their impact on GDP per capita.

Table 4.1.3 -Wald test for significance of explanatory variables:

Wald Test:
Equation: ARDL1

Test Statistic	Value	df	Probability
F-statistic	614.2108	(9, 502)	0.0000
Chi-square	5527.897	9	0.0000

Null Hypothesis: C(1)=0,C(2)=0,C(3)=0,C(4)=0,C(5)=0,C(6)
=0,C(7)=0,C(8)=0,C(9)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.171455	0.039640
C(2)	0.065674	0.015790
C(3)	0.018545	0.006572
C(4)	-1.759253	0.176565
C(5)	-0.056126	0.015351
C(6)	-0.006721	0.001123
C(7)	-0.023187	0.012330

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C(8)	-0.001931	0.000630
C(9)	-0.942892	0.022380

Restrictions are linear in coefficients.

4.2.1: Work file Statistics of Penal II

Workfile Statistics
Date: 08/31/19 Time: 10:41
Name: PENAL -II
Number of pages: 1

Page: Penal -II
Workfile structure: Panel - Annual
Indices: COUNTRY x DATEID
Panel dimension: 37 x 35
Range: 1983 2017 x 37 -- 1295 obs

Object	Count	Data Points
series	16	20720
coef	1	750
equation	1	
Total	18	21470

Table 4.2.2 ARDL Penal- II:

Dependent Variable: D(GDPPCG)
Method: ARDL
Date: 08/24/19 Time: 14:10
Sample: 1985 2017
Included observations: 1220
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LMS LHSPEC_EXP LEDU LLIFE LFDI LINVST POPUGR INFL LG
Fixed regressors: C
Number of models evalulated: 4
Selected Model: ARDL(1, 2, 2, 2, 2, 2, 2, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
LMS	0.233774	0.055356	4.223074	0.0000
LHSPEC_EXP	0.090489	0.017195	5.262589	0.0000
LEDU	-0.122077	0.077171	-1.581898	0.1143
LLIFE	3.228505	1.158927	2.785770	0.0055
LFDI	0.042183	0.007031	5.999981	0.0000
LINVST	0.286420	0.082368	3.477311	0.0005
POPUGR	0.207615	0.024863	8.350359	0.0000
INFL	-3.35E-05	7.76E-05	-0.431774	0.6661
LG	0.035401	0.058753	0.602536	0.5471
	Short Run Equation			

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COINTEQ01	-0.295208	0.050311	-5.867656	0.0000
D(LMS)	99.90530	1.063214	93.96539	0.0000
D(LMS(-1))	-71.15010	5.068209	-14.03851	0.0000
D(LHSPEC_EXP)	0.142991	0.127857	1.118370	0.2639
D(LHSPEC_EXP(-1))	-0.121806	0.105144	-1.158474	0.2472
D(LEDU)	0.205132	0.134438	1.525847	0.1276
D(LEDU(-1))	0.006752	0.253723	0.026611	0.9788
D(LLIFE)	-47.96676	26.35720	-1.819873	0.0693
D(LLIFE(-1))	57.35226	32.28555	1.776406	0.0762
D(LFDI)	-0.005973	0.006211	-0.961787	0.3366
D(LFDI(-1))	-0.002526	0.006332	-0.398844	0.6902
D(LINVST)	0.042271	0.396068	0.106728	0.9150
D(LINVST(-1))	0.245727	0.180493	1.361416	0.1739
D(POPUGR)	-0.424437	0.224061	-1.894296	0.0587
D(POPUGR(-1))	-0.367888	0.392347	-0.937661	0.3488
D(INFL)	0.005935	0.009942	0.596973	0.5508
D(INFL(-1))	-0.013790	0.012303	-1.120884	0.2628
D(lG)	-0.434887	0.839055	-0.518307	0.6045
D(LG(-1))	-0.965438	0.528020	-1.828410	0.0680
C	-6.865384	1.185590	-5.790688	0.0000

Mean dependent var	-0.033126	S.D. dependent var	3.523100
S.E. of regression	0.242079	Akaike info criterion	-1.219462
Sum squared resid	31.93830	Schwarz criterion	1.770457
Log likelihood	1537.992	Hannan-Quinn criter.	-0.097378

*Note: p-values and any subsequent tests do not account for model selection.

Based on ARDL results in table 4.2.2, three explanatory variables “EDU”, ‘NFL” and “G” are not significant. If we exclude these three variables from the discussion, we are left with 6 significant explanatory variables namely “MS”, “HSPEC_EXP”, “LIFE”, “FDI”, “INVST” and “POPUGR”.

First significant predictor variable in long run equation is “LMS”, log(market size). Value of its coefficient is 0.233774 which shows that with 10% increase in market sizr, GDP per capita growth will also increase by 2.33774%.

Second variable in long run ARDL equation with positive significant impact on GDP per capita is Export of High Technology Specialty Exports, i. e. “LHSPEC_EXP”, log (hspec_exp). Value of coefficient of lhsepec_exp is 0.090489 whish shows that with 100% rise in export of high tec. Category of exports, GDP per capita growth will enhance by 9%.

Third significant variable in long run equation is life expectancy at birth, i. e. “LLIFE”, log(life) with coefficient equal to 3.228505. So along with 1% change in life expectancy, GDP per capita Growth (GDPPCG) will increase by 3.23%. This shows that labour force has a strong positive impact on GDP growth of developed countries. Whereas majority of their labour force is educated, skilled and well trained.

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Next variable in long run equation is Foreign Direct Investment, i.e. "LFDI", log(FDI). It has a significant p value; less than 5%. Its coefficient is equal to 0.042183. It means, with 100% rise in FDI inflows, GDP per capita growth will raise by 4.2183%.

Next significant variable in long run equation of ARDL model is "LINVST", log(investment). As theory suggests, rising investment level has a positive impact on GDP per capita growth. Here the positive value of coefficient of investment confirms the theory. It shows that along with 10% increase in investment, GDP per Capita growth will increase by 2.864%

Sixth significant variable in long run ARDL is population Growth rate, "POPUGR". The value of coefficient is 0.207615. As per theory, population growth rate has a negative impact on GDP per capita growth. Penal II belongs to prosperous developed countries where population growth rate is mostly negative. That's why here it is positively related with GDP per capita growth.

Table 4.2.3 -Wald test for significance of explanatory variables:

Wald Test:
Equation: ARDL02

Test Statistic	Value	df	Probability
F-statistic	1515.271	(9, 545)	0.0000
Chi-square	13637.44	9	0.0000

Null Hypothesis: C(1)=0,C(2)=0,C(3)=0, C(4)=0,C(5)=0,C(6)=0,C(7)=0,C(8)=0,C(9)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.233774	0.055356
C(2)	0.090489	0.017195
C(3)	-0.122077	0.077171
C(4)	3.228505	1.158927
C(5)	0.042183	0.007031
C(6)	0.286420	0.082368
C(7)	0.207615	0.024863
C(8)	-3.35E-05	7.76E-05
C(9)	0.035401	0.058753

Restrictions are linear in coefficients.

4.3.1: Work file Statistics of Penal III

Workfile Statistics
Date: 08/31/19 Time: 11:14
Name: PENAL-III
Number of pages: 1

Page: panel III
Workfile structure: Panel - Annual
Indices: COUNTRY x DATEID

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Panel dimension: 20 x 35
Range: 1983 2017 x 20 -- 700 obs

Object	Count	Data Points
series	24	16800
coef	1	750
equation	1	
Total	26	17550

Table 4.3.2 ARDL Penal- III:

Dependent Variable: D(GDPPCG)
Method: ARDL
Date: 08/22/19 Time: 11:10
Sample: 1985 2017
Included observations: 651
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LMS LSPEC_EXP LEDU LRESOURCE LLIFE LINVST LFDI LG POPUGR INFL
Fixed regressors: C
Number of models evalulated: 4
Selected Model: ARDL(1, 2, 2, 2, 2, 2, 2, 2, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
LMS	0.880725	0.132538	6.645093	0.0000
LSPEC_EXP	0.336653	0.045871	7.339177	0.0000
LEDU	0.549489	0.107470	5.112972	0.0000
LRESOURCE	-0.339510	0.046892	-7.240207	0.0000
LLIFE	-4.285078	1.100201	-3.894814	0.0001
LINVST	-0.174808	0.051424	-3.399357	0.0008
LFDI	0.023469	0.006597	3.557315	0.0004
LG	-0.993917	0.070800	-14.03836	0.0000
POPUGR	-0.829915	0.016796	-49.41169	0.0000
INFL	-0.000998	0.001167	-0.854932	0.3934
	Short Run Equation			
COINTEQ01	-0.629821	0.159996	-3.936488	0.0001
D(LMS)	88.13620	6.821695	12.91999	0.0000
D(LMS(-1))	-42.68682	15.26884	-2.795682	0.0056
D(LSPEC_EXP)	1.043057	1.608090	0.648631	0.5172
D(LSPEC_EXP(-1))	1.112550	1.383018	0.804437	0.4219
D(LEDU)	1.118826	1.096777	1.020104	0.3087
D(LEDU(-1))	0.365522	1.334216	0.273960	0.7843
D(LRESOURCE)	1.080969	0.655462	1.649171	0.1004
D(LRESOURCE(-1))	-1.434607	1.033220	-1.388482	0.1662
D(LLIFE)	-5281.899	5234.007	-1.009150	0.3139
D(LLIFE(-1))	4696.834	4659.261	1.008064	0.3144
D(LINVST)	1.544690	0.731030	2.113034	0.0356

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D(LINVST(-1))	0.736280	1.777527	0.414216	0.6791
D(LFDI)	0.125220	0.171167	0.731569	0.4651
D(LFDI(-1))	0.245221	0.294001	0.834080	0.4050
D(LG)	-0.088926	1.459214	-0.060941	0.9515
D(LG(-1))	8.507882	4.600252	1.849438	0.0656
D(POPUGR)	0.699972	0.737487	0.949131	0.3435
D(POPUGR(-1))	1.090391	1.337162	0.815451	0.4156
D(INFL)	0.070672	0.071106	0.993895	0.3212
D(INFL(-1))	0.096809	0.092876	1.042347	0.2983
C	7.994533	2.417374	3.307115	0.0011

Mean dependent var	0.040871	S.D. dependent var	5.606192
S.E. of regression	1.852033	Akaike info criterion	0.090946
Sum squared resid	847.2168	Schwarz criterion	3.026460
Log likelihood	418.3054	Hannan-Quinn criter.	1.225920

*Note: p-values and any subsequent tests do not account for model selection.

First variable in long run equation is “LMS”, log(market size). Value of coefficient of LMS is 0.880725. Which shows that along with 10% Increase in Market Size, GDP per capita will grow by 8.8%.

Second variable in long run ARDL equation is “LSPEC_EXP”, log(specialty exports). Here specialty exports are natural specialty product exports. Along with 10% increase in Exports of natural specialty products, GDP per capita will grow by 3.34 % as the value of coefficient is 0.336653.

“LEDU”, log(edu) is log of government expenditures on education. Coefficient value is 0.549489. It means, with 10% increase in govt. expenditures on Education, GDP per capita will grow by 5.495%.

Fourth variable is “LRESOURCE”, Log(resource). Resource is measured by using natural resources rent. It has a negative coefficient value in estimated model. Which shows that, along with 1% rise in resources rent, GDP per capita growth will decline by 0.34%.

Next variable in long run equation is “LLIFE”, log(life). Increase in life expectancy at birth increases the population volume. So it has a significant negative impact on GDP per capita growth. With 1% increase in life expectancy, GDP per capita growth will decline by 4.285%.

Increasing investment in long run has a negative impact on GDP per capita growth. Coefficient of “LINVST” is -0.1748. Which shows that with 1% increase in investment, GDP per capita growth will fall by 0.1748%.

“FDI” (foreign direct investment) has positive impact on GDP per capita growth. Value of its coefficient is 0.023469. So, with 100% increase in FDI inflows, GDP per Capita will grow by 2.3469%

Coefficient value of “LG”, log(Govt Expenditures) is -0.993917. Smaller the govt. non developmental expenditures, higher would be GDP per capita growth. With 10% fall in govt. consumption expenditures, growth of GDP per capita will increase by 9.9%.

Last significant explanatory variable in long run equation is “POPUGR”. In the high income per capita countries of this category, population growth is often high, so it has a negative

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effect on GDP per capita Growth. As per its coefficient value(-0.829915), along with 10% rise in population growth rate, GDP per capita will fall by 8.2992%.

Shortrun results can also checked in the lower part of table4.3.2 but this study is mainly concerned with long run variables.

Table 4.3.3 -Wald test for significance of explanatory variables:

Wald Test:
Equation: ARDL3

Test Statistic	Value	df	Probability
F-statistic	3502.890	(10, 247)	0.0000
Chi-square	35028.90	10	0.0000

Null Hypothesis: C(1)=0,C(2)=0,C(3)=0,C(4)=0,C(5)=0,C(6)=0,C(7)=0,C(8)=0,C(9)=0,C(10)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	0.880725	0.132538
C(2)	0.336653	0.045871
C(3)	0.549489	0.107470
C(4)	-0.339510	0.046892
C(5)	-4.285078	1.100201
C(6)	-0.174808	0.051424
C(7)	0.023469	0.006597
C(8)	-0.993917	0.070800
C(9)	-0.829915	0.016796
C(10)	-0.000998	0.001167

Restrictions are linear in coefficients.

From the discussions made in section 4.1, 4.2 & 4.3, results can be concluded as:

Positive impact of specialty exports penal-I < **Positive impact of Knowledge intensive specialty exports penal-II** < **Positive impact of Natural specialty exports Penal-III**

One thing is worth mentioning here that countries included in penal-I mostly export simple manufacturing and natural specialty products. Few countries of penal-I export medium tech manufacturing products. None of these countries manufacture high tech products at all.

Conclusion

This particular study incorporated panel data estimation technique for the year 1983 to 2017 to determine the impact of various categories of specialty product exports on GDP per capita growth. For this purpose, three different panels were made depending upon the nature of their

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specialty exports. Firstly, ARDL model was applied on penal-I and results showed that 43 developing countries included in penal-I, have a positive impact of manufacturing and natural specialty products on GDP per Capita growth. Then, ARDL model was applied on penal-II and results showed that 37 developed countries of penal-II also possess positive impact of specialty exports on GDP per capita growth, But the strength of impact of penal-I is not as much as the knowledge intensive export of 37 developed countries included in penal-II have. Lastly, when ARDL model is applied on penal III, the results prove that the positive impact of natural specialty exports of 20 high income Percapita countries on their GDP per capita included in penal-III is the strongest of all.

Discussion on Policy Recommendations

For developing countries like Pakistan, such policies are recommended which could turn the direction of FDI Inflows towards the production of their specialty products. Govt. of a low income developing economy must try to increase the % share of educational expenditures in its budget. Because educated work force is required for the production of knowledge intensive goods. Similarly, highly trained and educated workforce is required to explore the mineral resources which could later serve as natural specialty exports.

Future Research Directions

Depending upon availability of required data, exports of knowledge intensive services can also be included in the model.

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