Caribbean Export Diversification along itsDevelopment Path

By

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Abstract

This paper exploresCaribbean exportdiversification along its development path usingthree inequality indicesand a countof active export lines at the intensive and extensive product margins. The study shows that Caribbean countries first diversify and subsequently re-specialize.Secondly, changes in the extensive margin play a greater role in this process though the intensive margin also contributes.

JEL Classification: F1, F43. O11

Key words: Export Diversification, Economic Growth, International Trade

1. Introduction

International trade theory takes two viewpoints: specialization and diversification. Classical and neoclassical economics advocate specialization premised on the theory of comparative advantage (Smith 1776 and Ricardo 1817) and theHeckscher-Ohlin model (Heckscher 1919 and Ohlin 1933).They argue that specialization enables countries to benefit from a division of labor, economies of scale, better resource allocation, efficiency and increased competitiveness all resulting in higher growth and development. In contrast, structural economic theories (Rosenstein-Rodan 1943, Prebish 1950, Singer 1950, Chenery 1979 and Syrquin 1989) and the natural resource hypothesis (Sachs and Warner 1999) argue that diversification away from the

primary into the manufacturing sector is necessary to overcome volatility and achieve sustainable growth.

Given these two conjectures recent theories focus on how export patterns vary along the development path (Cadot et al 2010, Klinger and Lederman 2004, Koren and Terenyo 2004 and Imbs and Wacziarg 2003).These studies suggest that both diversification and specialization are at play and economies undergo increasing diversification followed by increasing re-specialization along their development path. Although, they estimate the turning point from diversification to specialization to occur relatively late in the development process meaning that countries diversifyover the majority of the development process. From a policy perspective, this creates little room for intervention.

This paper aims to study export patterns along the development path of the Caribbean which is made up of small island developing states. It may be expected that these countries are incapable of undergoing diversification followed by re-concentrationbecause of their limited ability to diversify.Firstly,they have limited resource endowments and economies of scale. Further, given their small export volume they have only a handful of export destination countries. In addition, they receive preferential trading agreements from the United States (US) and Europe (Bennett 2008) which can create disincentives to diversify. Also, these countries are former colonies and were specialized in the production of agricultural products. Further, market and coordination failures associated in exporting new products and assessing foreign demandare more rampant in small developing states(Hausmann, Rwang and Rodrik 2002 and Klinger and Lederman 2005, Rodriguez-Clare 2005and Vettas 2002).

Besides the limited ability of the region to diversify, Cadot et al (2010) - the most comprehensive study in this area excluded island economies to overcome outlier problems. This study therefore adds to the existing literature by explicitly considering the above issues for the Caribbean. To this end the empirical analysis relies on detailed HS6 COMTRADE export data covering16 Caribbean countries over the period 1990-2008. The findings indicate that Caribbean countries experience increasing diversification followed by re-concentration at an approximate turning point of US$ 11810 (constant 2000). In levels the growth of existing product lines (intensive margin) accounts more for the increasing diversification followed by re-concentration phenomenon as GDP per capita rises. However, more importantly in terms of evolution the

addition of new export lines (extensive margin) dominates though the intensive margin follows the same pattern.

The paper consists of five sections including the introduction: section twodiscusses empirical issues, section three outlinesthe data and methodology employed, section four presents a theil decomposition and section five concludes the paper.

2. Empirical Issues

Diversification is a dynamic concept which makes measuring diversification problematic. Export diversification occurs when a country expands its product basket within the same sector (horizontal diversification) or across sectors (vertical diversification) and when a country increases the composition of its trading partners(geographic diversification) (Ali et al 1991 and Berthelemy and Chauvin 2000).Two related concepts are the intensive and extensive product margins also referred to as off the frontier and on the frontier goods by Klinger and Lederman (2004).The intensive margin is the growth in exports of goods that are already being exported in other words the growth in already active product lines and may involve searching for new markets. Contrarily, the extensive margin is the expansion of new products to the region.Given the above, this study uses four measures of diversification to improve robustness of the results: three inequalitymeasuresand active product lines. The measures do not capture geographic diversification directly.

Also, export measures can be absolute or relative. Absolute measures compare the distribution of export shares to a uniform distribution, while relative measures use some "benchmark" in comparing export shares. Parteka (2007) gives empirical evidence where the use of absolute and relative indices can affect the results in the evolution of diversification/specialization as GDP increases. Absolute measures were used in this study.

In terms of methodology,older studies tend to employ parametric methods only.Parametric methods assume an a priori probability distribution imposing a functional form on the relationship between growth and diversification.These parametric studiesgive contradictory results. Kim (1995) in a study of the US in 1960-1987 and Amiti (1999) for European countries in 1968-1990 provide evidence of increasing specialization. Alternatively, Laursen(1998)and Kalemli-Ozcan et al (2003)separately investigate OECD countries and uncovera general trend of

increasing diversification as income increases. Moreover, Proudman and Redding (2000) and Redding (2002) use transition probability matrices and conclude that there is no tendency for specialization to increase along with rising income.

More recently a number of papers have usedboth parametric and nonparametric methods.These studiestend to be in unison andfind an asymmetric hump or inverted U shaped pattern of increasing diversification followed by increasing specialization along a country's income path. Imbs and Wacziarg (2003) find this result using production and employment data.Koren and Tenreyro (2007) also use production data and arrive at similar results though they had a broader aim of studying the relationship between volatility and diversification. Klinger and Lederman (2005 and 2004) followed using export data.They show thatat early stages of development diversification tends to be driven by the introduction of new products and in laterstages discovery activity declinesand diversificationis driven by the production of more goods the country already produces andproduction becomes more specialized.Cadot et al (2010)confirm these findings using a large dataset of developed and developing countries for 1988-2004.

Production data examines the structure of the economy from an internal production perspective and export data from an external trade perspective.This study is interested in export diversification and therefore uses export data. Additionally, export data are more disaggregated which permit greater analysis, and usually are superior in qualitythan employment data.

The direction of causality between export growth and development is debatable and continues to be examined.The literature provides strong empirical evidence of the export led growth hypothesis(Dollar 1992, Ben-David 1993, Barro and Sala-i-Martin1995,Sachs-Warner 1995, Edwards 1998 andFrankel and Romer 1999). Further, the incredible growth of the South East Asian tigers is attributed to their free market outward oriented policies (World Bank 1993).Also, studies provide empirical evidence that in addition to export growth export diversification is imperative forGDP growth (Grossman and Helpman 1991, Piñeres and Ferrantino1997 and Fahim Al-Marhubi 1998).Rodriguez and Rodrik(2001)review the export led growth literature and argue that the causality from trade and growth is weak:simple linear regressions cannot capture complex growth processes;'openness' measures are problematic andlinked with other areas of poor growth;trade policy and outcomes are correlated with other growth policies.

Nevertheless, they do not deny that many countrieshave developed successfully because of an increase in their exports.

Table 1 provides a summary of the existing empirical studies and their findings.

Table 1: Summary of Empirical Studies on Specialization/Diversification along the Development Path

Study	Data	Index	Method/Estimator	Finding
Cadotet al (2008); 159 Mix,1988-2004	T[1](HS6: 4998 product lines)	Herfindhal, Theil, Gini	P, non-P: LOWESS	U shape (US$20000-22000)
Koren and Tenreyro (2007) 42 Mix, 1963-1998	Prod (UNIDO, 3 digit:19 sectors and OECD STAN: 18 sectors)	Herfindhal Weighted	P, non-P: LOWESS	U shape (US$14000)
Parteka(2007) 32 Mix,1980-2005	E,T (ISIC Rev 2, 3 digit:27 sectors)	Herfindhal, Gini, Theil, CV	non-P,simi-P GAM, Fixed effects	S↓
De Benedictis (2006) 40 Mix, 1985-2001	T(SITC Rev 2,3 digit: 30 sectors and 4 digit: 500 sectors)	RCA(median)	Simi-P, GAM	D↑
Klinger and Lederman (2005,2004) 53 Mix,1990-2003	T (HS4: 1200 commodity groups, HS6:5000 commodity groups and SITC Rev1, 3 digit:175 commodity groups)	Herfindhal	Non-P Fixed effects	U shape 17350-17500
Imbs and Wacziarg (2003) 99 Mix,1969-1997	Prod, E (ILO1digit: 9 sectors; UNIDO 3 digit:28 sectors; OECD 2 digit:20 sectors)	Gini Herfindhal	P, non-P Fixed effects	U shape (US$16500)
Kalemli-Ozcan et al (2003) 21 OECD, 1977-1993	Prod (ISIC, 2 digit)	Sq Deviation	P Instrumental Variables	S↓
Redding (2002) 7 OECD,1970-1990	Prod (20 manufacturing industries)	GDP shares	P Transition probabilities	S unchanged
Brilhart (2001) 13 EU, 1972-1996	Prod, E	Gini	P	S Mixed
Brasili et al. (2000) 14, 1970-1995	T (WTDB, SITC Rev 2: 2 digit, 65 sectors)	RCAS	P and non-P, Transition Probabilities	S unchanged
Proudman and Redding (2000) G5,1970-1995	T (OECD BTD)	RCA	P	S unchanged
Amiti (1999) 10 EU,1968-1990	Prod and E (EUROSTAT:65 manufacturing industries and	Gini, RCA (weighted)	P	S↑

[1] In table T, E, T and Prod represent Employment, Trade and Production data respectively; P and non-P use of Parametric or non-Parametric methods; and S and D corresponds to Specialization and Diversification.

	UNIDO:27 manufacturing industries)			
Laursen (1998) 19 OECD,1971-1991	T (OECD STAN)	RCA	P Galtonian	S↓
Kim (1995) US Sates, 1960-1987	E(SIC 2 digit)	Krugman Hoover	P Fixed effects	S↓

Source: Author's Compilation.

3. Data and Methodology

The study examines sixteen Caribbean countries[2] over the period where the required data are available, 1990-2008 (18 years). Two main sources of data are used: exports and GDP per capita.

The export data comes from the United Nations Conference on Trade and Development (UNCTAD) COMTRADE database at the highest level of disaggregation, HS6.It covers 4991merchandise product lines.A limitation of the data is that service exports are not included. Data on disaggregated export services are difficult to obtain and do not exist for most Caribbean countries. As such a shortcoming of the study is that services export is not considered and many Caribbean countries depend heavily on tourism and financial services.

GDP per capita data comes from Bulmer-Thomas (2010). It offers complete GDP data for the Caribbean compared to other sources such as the World Bank's World Development Indicators (WDI) and the World Penn tables. The dataset combines data from several online sources: WDI, the United Nations Database, the United Nations National Accounts and CEPAL (2009). Each country is treated separately to derive the most accurate and complete GDP data series. GDP in current dollars is converted to constant 2000 dollars using the GDP deflator. Where a GDP deflator does not exist given the stability of nominal exchange rates for Caribbean countries domestic inflation in local currency units is used as a proxy for the GDP deflator. In cases where the exchange rate changed significantly inflation in local currency units is adjusted for changes in the nominal exchange rate. Bulmer-Thomas (2010) gives detail notes on how the dataset for each country is obtained.

3.1. Export Diversification/Specialization Measures

[2] Anguilla, the Bahamas, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, Montserrat, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago.

As was earlier stated, export growth can be measured at the intensive or extensive product margins(Brenton and Newfarmer 2009). The intensive margin measures diversification as the expansion of more volume in current export lines, that is, exporting a larger volume of existing products to old markets. In contrast, the extensive margin measures the increase in export lines via new products and markets.This paper measures diversification using three inequality indices- the Herfindahl index, theTheil index and the Gini index and the number of active product lines. The three indices are computed for active export lines only and measure diversification at the intensive margin.While, the number of active product lines measures diversification at the extensive margin by counting the number of active lines.

The three indices are taken from the income inequality literature and are positively correlated to income concentration but when applied to export data they are inversely related to diversification.In addition, they are calculated as absolute indices. The calculations are done for every year and country using export shares.Assume there is "n" export sectors in "N" countries and the share of export "X" in sector i =1,2,…n is the total exports of country j=1,2,…N. Thenthe export share"S_{ij}" is specified as:

$$S_{ij} = X_{ij} / \sum_i X_{ij}$$

The Herfindahlindex is the most popular index for measuring diversification. It is calculated by taking the squareof the export share of all export categories in the market and when normalized between 0 and 1 is:

$$H^* = \frac{\sum_k (S_{ij})^2 - 1/n}{1-1/n}$$

It gives greater weight to the larger export shares. A value of unity indicates perfect specialization where a country exports only one commodity and vice versa.

The Theil index is a type of entropy index. When used for measuring export diversification, export shares are weighed by the logarithms of the exportshare of each category.The larger theindex the more specialized a country's exports and is calculated by the formula:

$$T = 1/n \sum^{n}_{i=1} X_{ij} / \mu \ln (X_{ij} / \mu)$$

where $\mu = \sum^{n}_{i=1} X_{ij}/ n$

In calculating the Gini index Brown's formula is used. Like the Herfindahl index a value of one represents perfect specialization and a value of zeroperfect diversification.For each country year export lines are sorted by years, then indexed by "ij" and by an increasing order of export value "x" so that $x_{ij} < x_{ij+1}$. Cumulative export shares are:

$X_{ij} = \sum^{ij}_{l=1} x_l / \sum^{n}_{l=1} x_l$

and cumulative shares in the number of export lines are simply "ij/n". The Gini index is then calculated by:

$G = | 1- \sum^{n}_{ij=1} (X_{ij} – X_{ij-1}) (2_{ij}-1)/n|$

The number of active export lines is the number ofnon-zero export lines over the sample period for each country year. It is positively correlated to diversification. However, a critical limitationis that high value and low value product lines are treated equally. A country that diversifies by exporting high tech electronics and another that diversifies via agricultural products both obtain an added export line. The focus of the paper however is to measure diversification equally across all products.

A caveat on using thesemeasures is thatthey are an imperfect proxy. Firstly, the data does not capture service exports as previously mentioned. In addition, all merchandise trade may not be listed. Also, there may be missing product values. Further, export data for different sectors are subject to different levels of disaggregation which makes it difficult to combine various export sectors into one coherent index.Moreover, measuring diversification is not straightforward. Diversification can occur because of changes in thecomposition of a country's export basket or trade partners. The measures used in this study do not consider diversification in terms of the number of trading partners.

The measures are calculated for 16 Caribbean countries for each year for 1990 to 2008.Table A2 in the appendix displays thesefigures.On average the indices barely increase from the 1990s to

2000s indicating a small increase in specialization at the intensive margin. Although, the average number of active export lines also increase slightly indicating increased diversification at the extensive margin.

Examining diversification for individual Caribbean countries, table 2 displays a diversification raking in the 1990s and 2000s using the Herfindahl index and active export lines. Trinidad and Tobago has the highest number of active export lines in the 1900s and 2000s; it is the most diversified countryalong the extensive margin followed by the Bahamas and Cuba in the 1990s and the Dominican Republic and Jamaica in the 2000s. On the other hand, diversification along the intensive margin shows that the Bahamas followed by Trinidad and Tobagoand Grenada in the 1990s have the smallest indices and in the 2000s the Dominican Republic followed by Grenada and Dominica. Indices for the Dominican Republic could not be calculated in the 1990s.

Table 2:
Diversification ranking, 1990s and 2000s

Herfindahl Index		**Number of active export lines**	
1990s	**2000s**	**1990s**	**2000s**
BHS	DOM	TTO	TTO
TTO	GRD	BHS	DOM
GRD	DMA	CUB	JAM
BLZ	GUY	JAM	GUY
GUY	TTO	BLZ	CUB
DMA	VCT	DOM	BHS
VCT	LCA	GUY	LCA
JAM	BHS	LCA	SUR
KNA	MSR	KNA	VCT
LCA	AIA	VCT	GRD
SUR	CUB	SUR	KNA
	BLZ	DMA	DMA
	KNA	GRD	BLZ
	JAM	MSR	AIA
	SUR	HTI	MSR

Source: Based on Author's Calculations.

All three indices do not move in unison at all times but at least two does. Pearson correlations are calculated on a pairwise basis and shown in table A3 in the appendix.All coefficients of correlation have the expected positive sign; the higher the value of the index, the more concentrated the export basket.Thus, the results of the study should not be too sensitive.

The measures calculated are the same as that used byCadot et al (2010) for a much larger sample of 159 developed and developing countries over the period 1988-2004.Table 3 puts side by side the descriptive statistics for that study and the Caribbean.Cadot et al (2010) averageGDP per capita andindices area little larger than that of the Caribbean.On the contrary the region's number of active product linesper country year is significantly smaller at 809with a minimum of 64 for the Bahamas and a maximum of 2798 for Trinidad and Tobago. This indicates that there is substantial room for Caribbean diversification at the extensive margin.

Table 3: Descriptive Statistics

Variable	Mean		Standard Deviation		Minimum		Maximum	
	Caribbean	Cadot et al	Caribbean	Cadot et al	Caribbean	Cadot et al	Caribbean	Cadot et al
Herfindahl	0.171	0.189	.065	0.235	0.060	0.002	0.264	0.989
Theil	3.786	4.865	.739	1.797	1.768	1.478	4.200	8.465
Gini	0.962	0.967	.032	0.045	0.867	0.773	0.974	1.000
Active Products	809	2 062	606	1 670	64	8	2798	4 988
GDP per capita(constant 2000 $US)	4 850	5 864	3638	11 131	436	57	1734	54 178

Source: Author's Calculation and Cadot et al (2010).

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3.2. Regression Analysis

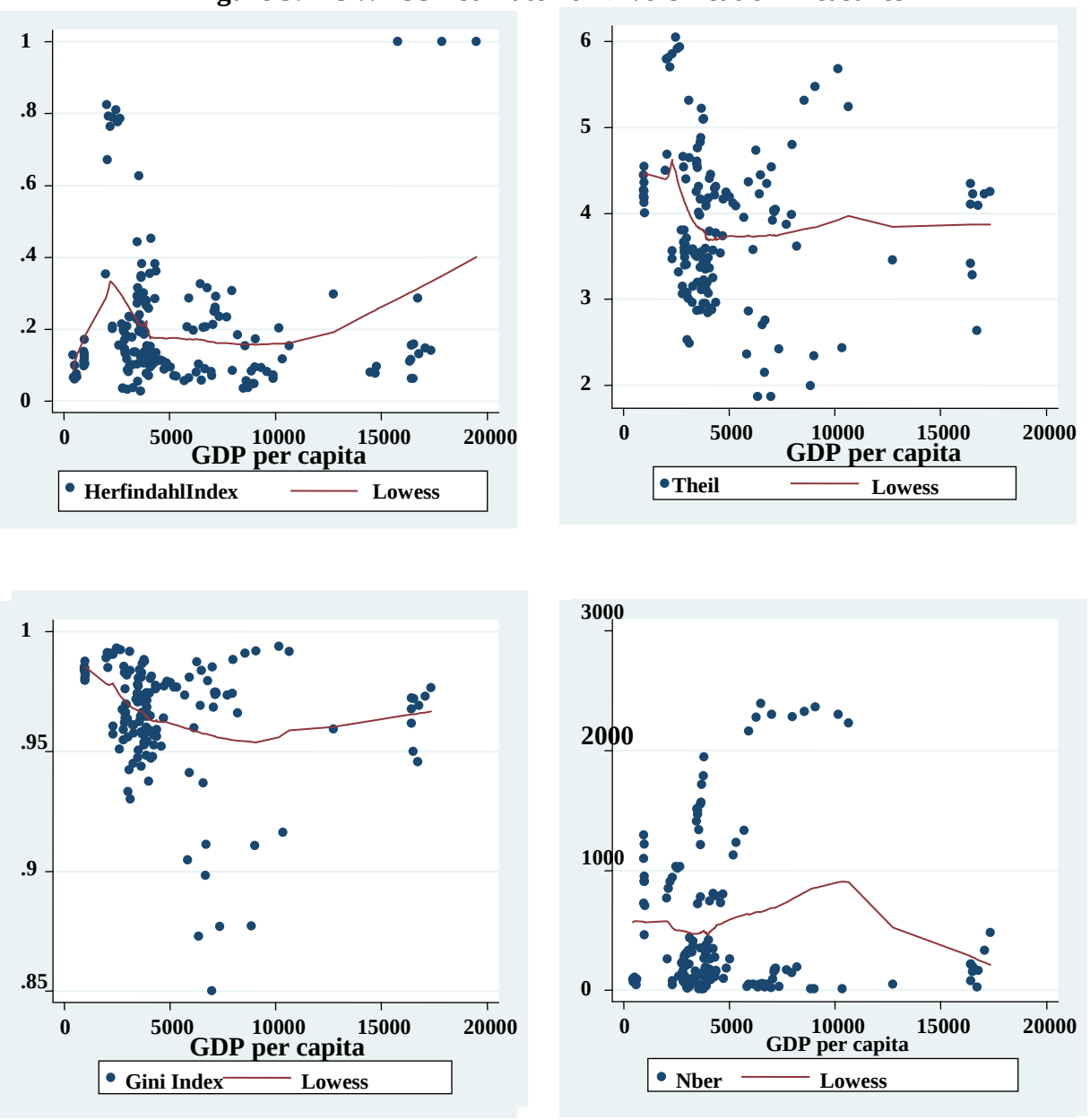
Asa precursory analysis a non-parametric estimator,the Locally Weighted Scatterplot Smoothing estimator (LOWESS) as developed byCleveland (1979)is runon the three indices the number of active export lines and GDP per capita.LOWESS is characterized by a bias/ variance trade-off and is directed by a smoothing parameter.Generally, the smaller the parameter the more LOWESS curve maps individual data points. Increasing the value of the parameter increases the smoothness of the curve.In carrying out the process, firstly the number of points in the neighborhood of the trend is computed. This is the smoothing parameter times the number of data points rounded to thenearest integer. Secondly, a tri-cube function is used to generate a weighted least squares fit. If the smoothing parameter is "q" and "d_i" the distance from x_i to its q^{th} nearest neighbor then the weight given to point (x_k,y_k) is:

$t_i\ (x_k) = T\ [(x_i - x_k)/d_i]$

where T is the tri-cube weight function.

This typeof weighting scheme provides decreasing weights on observationsfurther away from x_i. A regression line is fitted by a weighted least squares of y to x. The procedure isreplicated for every observation; thereforethe number of regressions must equal the number of observations. Thefitted values are then used to construct the non parametric curve representing the relationship between y and x.This creates a fitted curvethat does notforce any a priori functional form or strength of the relationship between the diversification measures and GDP per capita. Visually from the results (figure 3)a non-monotone non-linearrelationship exists between diversification/specialization and development- the indices decrease then increase while the number of active export lines increase then decrease.

Figure 3: LOWESS Estimator of Diversification Measures

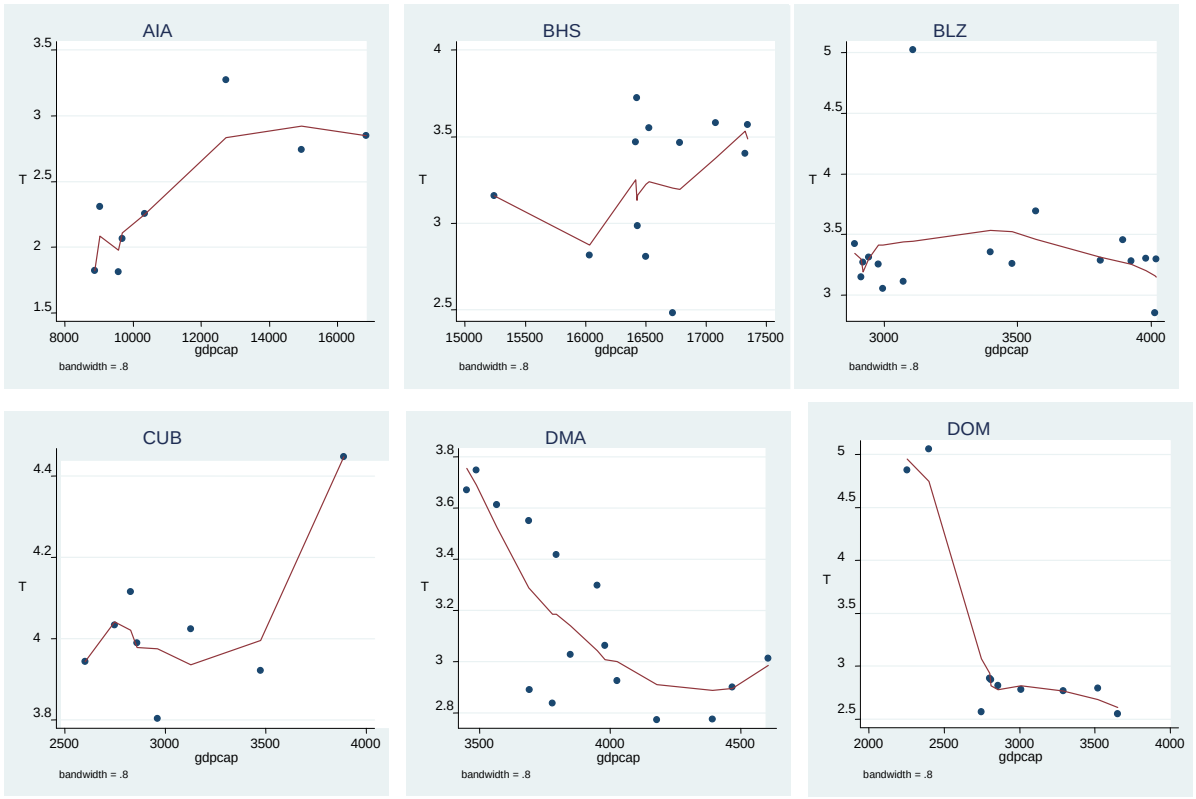


Source: Author's Calculation.

The above LOWESS is based on pooled data. This can mask differences in individual country patterns of de-specialization/concentration along the GDP per capita path.For this reason, LOWESS is applied to individual country specific diversification/specialization curves.Figure 4 shows the graphs for theHerfindahl index. Each country shows various rising or fallingtrends of diversification along their individual development path. The higher income countries such as Anguilla, the Bahamas and Trinidad and Tobago are on the rising part which indicates increasing concentration whereas lower income countries such as Belize, Haiti and St. Lucia are on the

downward sloping portion indicating increasing de-specialization. Therefore the pattern of increasing diversification followed by re-concentration is exists for individual Caribbean countries.

Figure 4: LOWESS Applied to Individual Caribbean Countries

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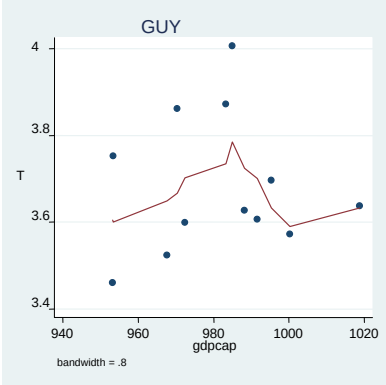
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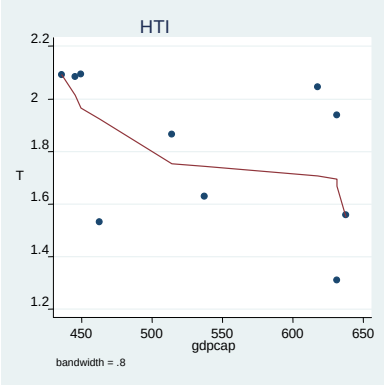
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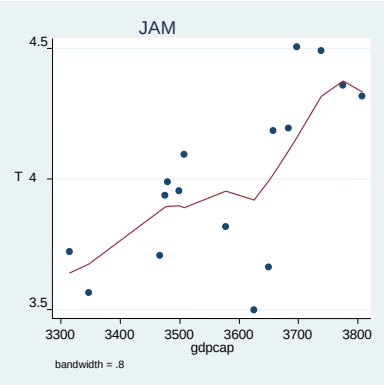
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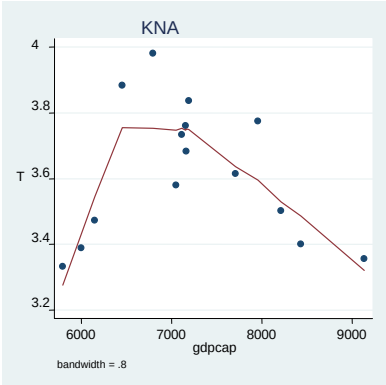
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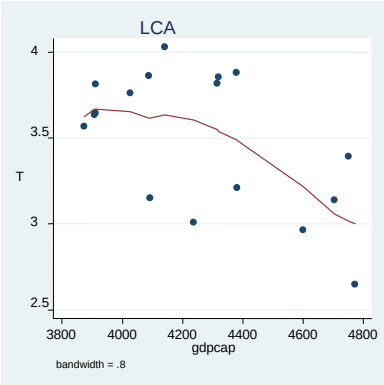
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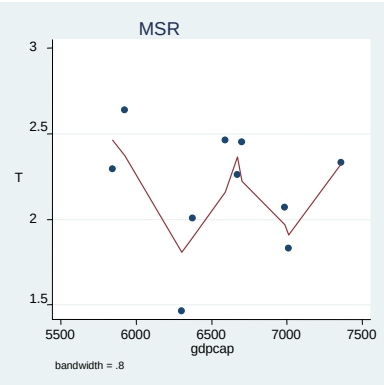
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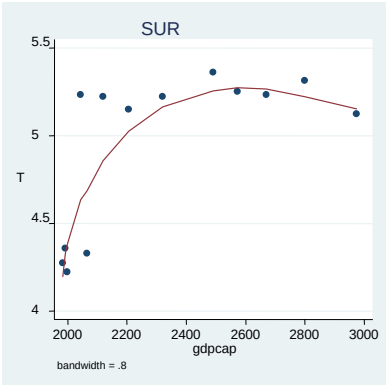
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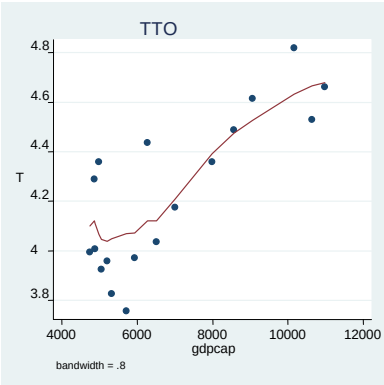
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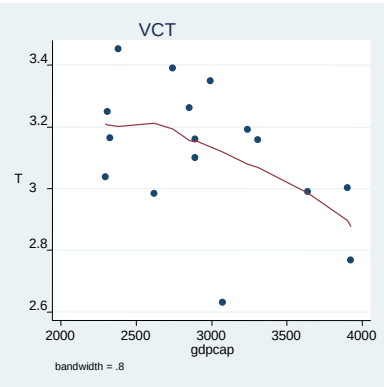
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The two major limitations of the LOWESS estimator are that it gives no meaningful parameter estimates and is extremely sensitive to outliers. Contrarily, parametric estimationprovides parameter estimates and is not as sensitive to outliers. The researcher must however specify a functional form on the estimate relationship. Since visually an asymmetric Uor hump shape exists aquadratic fixed effects panelregression is runwith the three indices and the number of active export lines being the dependent variable and GDP per capita and GDP per capita sqaredthe independent variables. The estimated equation is:

Herfindahl, Gini,Theil or Nber = $\beta_0 + \beta_1$ (GDP per capita) + β_2 (GDP per capita)^2+ U_t

where$U_t$is the white noise error term.

In running a panel regression a choice must be made among the Fixed Effects, Random Effects and Pooled models. The Fixed Effects estimator is the preferred method as it assumes that there are major differences among individual Caribbean countries but little temporal effect. In other words it describes what happens to diversification in a typical Caribbeancountry along the growth path.However, as a measure of robustness a Random Effectsand pooled OLS estimators are run and countries on either side of the turning point observed.

Table 4 shows the estimated results. The coefficients are correctly signed and highly significant, thereforeCaribbean exports experience growing diversification followed by specialization. Both the indices and the number of active product lines shows that exports become more and more diversified in the early stages of development but eventually specialization sets in. The turning point occurs at a comparable level of GDP per capita, between US$6 927- US$12 768 (constant 2000 dollars) and as expected is significantly lowerthan the turning point found by Cadot el al (2010) which isUS$ 23 557-US$ 27 928 (constant 2000 dollars).The general conclusion is that as Caribbean countries develop diversification at the intensive and extensive margins increase but later on their exports re-concentrate.The turning point remains within the $6 927- US$12 768 range for the OLS estimator as well (see table 4). Moreover, the countries on either side of the turning point remain the same.

Table 4: Regression Results

	Fixed Effects Results			
Variable	**Coefficient**			
	Herfindhal	**Theil**	**Gini**	**Nber**
GDPpc	-.0001277***	-.0001739 **	-.0000123 ***	.3171667***
GDPpcsq	9.22e-09***	2.35e-08***	8.66e-10***	-.0000124***
Turning point	6 927	10851	7 122	12768
R sq	0.06	0.05	0.05	0.44
	Pooled OLS Results			
Variable	**Coefficient**			
	Herfindhal	**Theil**	**Gini**	**Nber**
GDPpc	-.0000387***	-.0000939*	-.0000491***	.0371622*
GDPpcsq	2.35e-09***	4.40e-09*	2.79e-09***	-2.27e-06 *
Turning point	8232	10663	10744	8183
R sq	0.12	0.10	0.14	0.01
	Pooled OLS Results (Cadot et al 2010)			
Variable	**Coefficient**			
	Herfindhal	**Theil**	**Gini**	**Nber**
GDPpc	-1.89e-05***	-0.0002516***	-5.98e-06***	2.65e-01***
GDPpcsq	4.09e-10***	4.99e-09***	1.12e-10***	-4.67e-06***
Turning point	23 105	25 210	26 744	28 396
R sq	0.12	0.37	0.50	0.64

****, **, * Significant at 1%, 5%, and 10% level.*

Apart from the level of the turning pointwhich countries are on either side is important; table 5 shows this. The higher income countries have entered the re-concentration stage: the Bahamas and Anguilla are notably beyond the turning point while Trinidad and Tobago and St. Kitts and Nevis lie within the turning point. Diversification in these countries would decrease as they continue along their growth path. All other countries are located on the diversification portion. Montserrat is just below the turning point. Cuba, the Dominican Republic and St. Lucia are within reasonable reach. Haiti, the least develop country lies furthest away from the turning point followed by Guyana and Suriname. Diversification is expected to increase as these countries develop.

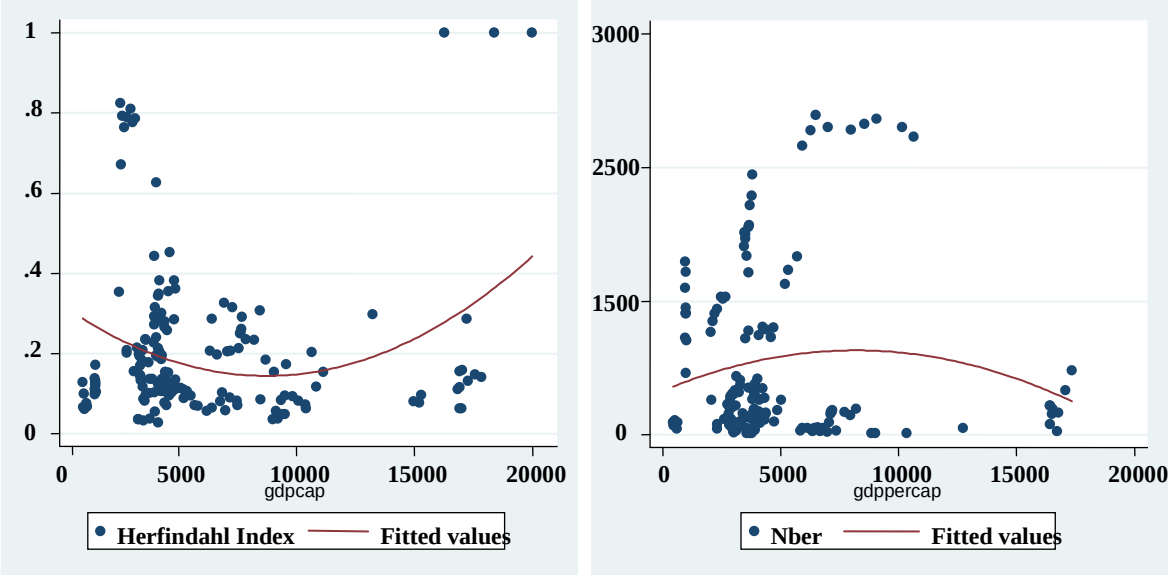
Table 5: Countries on the Diversification/Specialization side of the Turning Point

Country	GDP per capita in 2008 (constant 2000) US$	Diversification	Specialization
AIA	16 844	BLZ	AIA
BHS	17 473	CUB	BHS
BLZ	3 691	DMA	KNA
CUB	4 355	DOM	TTO
DMA	4 760	GRD	
DOM	3 731	GUY	
GUY	1 015	HTI	
GRD	4 778	JAM	
HTI	390	LCA	
JAM	3 910	MSR	
KNA	8 465	VCT	
LCA	4 988	SUR	
MSR	6 589		
SUR	2613		
VCT	4454		
TTO	10 931		

Source: Author's Calculation..

Figure 4 shows the predicted values of the Herfindahl index and the number of active export lines. The Herfindahlindex follows a U shape. The decreasing part of the curve shows increasing diversification and the rising part specialization. The number of active export lines takes an inverted U or hump shape with the increasing part of the curve represents the opening up of new export lines and thefalling part illustrates that as income increases Caribbean countries begin to shut down export lines quicker than they create new lines causing re-concentration along the extensive margin.

Figure 4:
Fitted values of the Herfindahl Index and the Number of active export lines

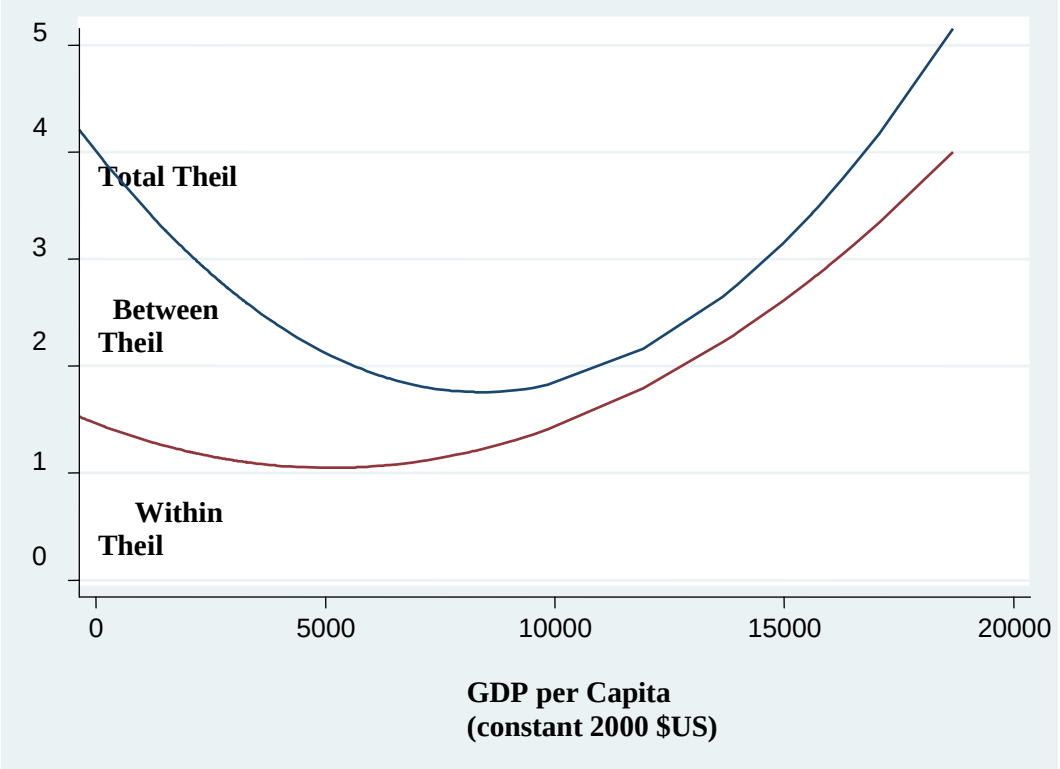


Source: Author's Calculation.

4. Theil Decomposition into Intensive and Extensive Product Margins

Changes in the intensive and extensive exports margins could explain the above export pattern.The theil index can be decomposed to measure both margins. The index iscalculated as the weighted average of inequality within subgroups and inequality among those subgroups. As suchit can be decomposed into a between and within group component. The index is applied to active and inactive export lines. The betweengroupscomponent of the index measures changes at the extensive margin and the withingroups component maps changes in the intensive margin. See Cadot et al (2010) for a detailed breakdown of the theil decomposition. They conclude that the extensive margin plays a greater scope in explaining the increasing diversification followed by re-concentration thought the intensive margin follows the same pattern. A similar conclusion is drawn for the Caribbean. Figure 5 shows that in levels the intensive margin is larger than the extensive margin. However, in terms of evolution Caribbean diversification is dominated by the extensive margin and the intensive margin follows the same pattern. The observed Caribbean diversification and subsequent re-specialization is therefore driven more by the extensive margin.

Figure 5: Total Theil, Within Theil and Between Theil



Source: Author's Calculation.

5. Conclusion

The literature takes two tenets – one strand says diversify the other specialize. The empirical evidence suggests that both are necessary along the development path. This paper uses three inequality indices and the number of active product lines and GDP per capita to prove empiricallythat even for the small island economiesof the Caribbean given their limited ability to diversify undergo increasing diversification followed by re-specialization along their development path. Though the turning point for the region is much smaller than that of the world US$ 11810 (constant 2000) and US$ 25 743 (constant 2000) respectively. It is expected that the higher income Caribbean countries will continue to endure specialization and the lower income countries diversification.

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Appendix

Table A1: Countries and their respective isocodes

Country	Isocode
Anguilla	AIA
The Bahamas	BHS
Belize	BLZ
Cuba	CUB
Dominica	DMA
Dominican Republic	DOM
Grenada	GRD
Guyana	GUY
Haiti	HTI
Jamaica	JAM
St. Kitts and Nevis	KNA
St. Lucia	LCA
Montserrat	MSR
St. Vincent and the Grenadines	VCT
Suriname	SUR
Trinidad and Tobago	TTO

Table A2: Individual Country Diversification Measure, 1990-2008

Country	1990-94				1995-99				2000-04				2005-08			
	H	T	G	Nber	H	T	G	Nber	H	T	G	Nber	H	T	G	Nber
Cbean	0.265	4.19	0.978	627	0.658	5.184	0.989	705	0.785	5.891	0.992	849	0.297	5.464	0.992	891
AIA	-	-	-	-	-	-	-	-	0.099	2.254	0.901	206	0.297	3.453	0.959	251
BHS	-	-	-	-	0.063	3.413	0.962	1229	0.125	4.009	0.966	1235	0.192	3.705	0.965	906
BLZ	0.117	3.403	0.964	621	0.158	4.035	0.975	749	0.294	3.612	0.974	302	0.119	3.455	0.973	343
CUB	-	-	-	-	-	-	-	1061	0.202	4.558	0.983	1155	-	-	-	1170
DMA	-	-	-	374	0.172	3.408	0.963	395	0.108	3.032	0.955	381	0.111	2.961	0.956	327
DOM	-	-	-	-	-	-	-	665	0.043	3.018	0.949	1155	0.038	3.072	0.952	1459
GRD	-	-	-	309	0.117	2.885	0.942	325	0.119	3.103	0.954	426	0.096	3.043	0.945	515
GUY	-	-	-	-	0.171	4.361	0.985	611	0.117	4.148	0.981	1169	0.117	4.360	0.985	1397
HTI	0.073	1.864	0.875	156	0.128	2.259	0.909	202	-	-	-	-	-	-	-	-
JAM	0.202	4.070	0.968	944	0.265	4.491	0.976	1053	0.339	4.956	0.984	1155	0.281	5.098	0.988	1444
KNA	-	-	-	558	0.261	4.125	0.970	546	0.269	3.994	0.974	447	0.184	3.616	0.966	394
LCA	0.265	4.086	0.968	794	0.362	4.328	0.976	556	0.187	3.919	0.965	897	0.112	3.638	0.958	1057
MSR	-	-	-	-	-	-	-	204	0.140	2.355	0.895	196	0.200	2.447	0.914	121
SUR	-	-	-	346	0.658	5.184	0.989	398	0.785	5.891	0.992	727	-	-	-	779
TTO	0.096	4.190	0.978	1664	0.071	4.127	0.977	2077	0.090	4.766	0.987	2708	0.177	5.464	0.992	2568
VCT	-	-	-	510	0.198	3.563	0.960	508	0.157	3.483	0.959	580	0.111	3.353	0.958	635

Source: Author's Calculation.

Table A3: Pairwise Correlation Coefficients

	Herfindahl	**Theil**	**Gini**
Herfindahl	1.0000	0.8530 (0.0000)	0.8098 (0.0000)
Theil	0.8530 (0.0000)	1.0000	0.9862 (0.0000)
Gini	0.8098 (0.0000)	0.9862 (0.0000)	1.0000

Source: Author's Calculation.