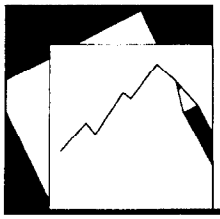
WP/02/148



IMF Working Paper

Trade and Integration in the Caribbean

Philippe Egoumé-Bossogo and
Chandima Mendis

INTERNATIONAL MONETARY FUND

 WP/ 02/148

IMF Working Paper

Western Hemisphere Department

Trade and Integration in the Caribbean

Prepared by Philippe Egoumé-Bossogo and Chandima Mendis[1]

Authorized for distribution by Jorge P. Guzmán

September 2002

Abstract

This paper analyzes trade in the Caribbean community (CARICOM) using a gravity model framework. The paper seeks to shed light on the dynamics of trade among CARICOM member countries, as well with the rest of world over 1980–99. Overall, the results show that intra-CARICOM trade has increased, suggesting that further regional integration is desirable. At the same time, CARICOM's trade with the rest of the world has risen as well, fueled notably by the reduction of the arrangement's common external tariff and despite the negative impact of the declining preferential access to EU markets for banana. In contrast, WTO membership does not appear to have had a positive impact on trade. Overall, it appears that trade liberalization is consistent with greater CARICOM trade integration.

JEL Classification Numbers: F11, F13, F15

Keywords: Trade, integration, Caribbean, gravity model

Authors' E-Mail Addresses: pegoumebossogo@imf.org, cmendis@imf.org

---

[1] We would like to thank without implicating Tamim Bayoumi and participants at a Western Hemisphere Department seminar for insightful comments and suggestions; the CARICOM Secretariat for providing the data on intra-CARICOM trade; Ricardo Davico for excellent research assistance; and Maria Cristina Barbosa, Joan Hewitt, and Eneshi Kapijimpanga for editorial assistance.The contributions of Thomas Duffy and Jorge Shepherd, who also provided research assistance, are acknowledged.

Contents Page

I. INTRODUCTION

The issue of trade integration in the Caribbean has come to the forefront of the policy debate in the region. Using standard trade equations, linking trade with income and geographic distance, most of the empirical work have applied the gravity model to global data sets (Bayoumi, 1999) or to compare regional trade within a global North-South framework (Coe and Hoffmaister, 1999), or trade between particular regions (Al-Atrash and Yousef, 2000). While the benefits of trade integration have been well documented in both the theoretical and empirical fronts in other regions, a systematic analysis of this important and pertinent topic has not been undertaken for the Caribbean (CARICOM) region so far.[2]

This paper aims to fill that gap, while contributing to the empirical analysis of trade integration using trade data from the CARICOM region. Standard gravity trade equations, linking bilateral trade with income, population, and distance in a panel data framework are estimated to test the trade-creating and trade-diverting aspects of CARICOM. The trade-creating and trade-diverting aspects of regional trade are measured by a series of dummy variables, capturing regional arrangements, including the CARICOM, African Carribean and Pacific States (ACP), Common Market for Eastern and Southern Africa (COMESA) and others. Various measures of trade liberalization and institutional arrangements are introduced to test the impact on total trade. Some of these measures include the evolution of the banana trading regime of the European Union (EU), the implementation of the Common External Tariff (CET), and accession to the World Trade Organization (WTO).

The dataset comprises a sample of 31 entities over the 1980–99 period. Apart from the CARICOM, a representative sample of North American, European Union, Latin American, and Asian countries is constructed. The econometric estimation involves the estimation of five cross-sectional points, (1980, 1985, 1990, 1995 and 1999); a panel of these cross-sectional points; four period averages, (1980–84, 1985–89, 1990–94, and 1995–99), and the panel of these period averages. This framework allows for a systematic cross-sectional and dynamic analysis of CARICOM's trade.

The remainder of the paper is organized as follows. Section II provides the theoretical background and surveys the empirical literature. Section III discusses the issues of trade and economic integration in the CARICOM region. Section IV reviews data and econometric issues. Section V analyzes the results of the estimation of the gravity model. The final section concludes and provides policy recommendations.

---

[2] The grouping comprises Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, and the British territory of Montserrat.

II. Survey of the Literature

A. Theoretical Background

The gravity model is the most commonly used analytical model for studying bilateral trade. In its simplest form, the gravity model relates some measures of bilateral trade with the economic mass of two countries or regions and the distance between them. These two factors have opposing effects on the level of trade between the regions. Economic mass positively affects trade, and geographic distance has a negative effect. The formulation thus makes it possible to test, after controlling for these "size" and "distance" effects, whether trade between two countries is "normal" or not given their sizes and the distance separating them. This in turn would indicate whether two regions or countries are likely to engage in trade integration.

Anderson (1979), in a theoretical contribution, shows how the gravity model can be used to derive expenditure share equations on the assumption that commodities are distinguished by the country or region of production (see Appendix III). Helpman (1984) and Bergstrand (1985) extend this for differentiated products, while Deardroff (1995) shows how the gravity model is consistent with the Hecksher-Ohlin model with transportation costs. Krugman (1985) uses elasticities to show how domestic output can be correlated with real exports.

A commonly used empirical specification based on the theoretical model discussed earlier takes the form:

$$TRADE_{ijt} = (Y_{it}Y_{jt})^{\alpha}(P_{it}P_{jt})^{\beta} D^{\delta}{}_{ij} e^{\mu_{ijt}},$$

where *TRADE* is bilateral trade, such as the sum of exports and imports, from country *i* to country *j*. *Y* represents nominal GDP, P is population, and *D* is the geographic distance between country *i* and *j*. From the theoretical priors, nominal GDP has a positive effect on trade while distance has a negative effect. μ_{ijt} is the distribution of the error term, which takes the form:

$$\mu_{ijt} = \gamma_{I1} + ... + \gamma_{In} + \varsigma_t + \varepsilon_{ijt},$$

where γ_I are fixed effects for one group, up to *n* groups; ς are time effects, and ε_{ijt} is an (i.i.d) error term. The differences in trading patterns between the regions are tested by using the time dummies with a time trend. The equations are also estimated with variables capturing linguistic ties between regions, evolution of regional trading arrangements, commodity composition of exports, and trade policy measures.

B. Empirical Literature

There has been extensive empirical analysis based on the gravity model over the years. The basic propositions have been tested for various trading relationships, for example between the member countries of a trading bloc such as the EU (Bayoumi and Eichengreen, 1995), or between the North and South (Coe and Hoffmaister,1999), or both intraregional and interregional trade (Al-Atrash and Yousef, 2000; and Subramanian and Tamirisa, 2001). We discuss briefly some of these papers.

Coe and Hoffmaister (1999) use the gravity model to investigate the variation in bilateral trade between southern developing countries and northern industrial countries, in order to determine if Africa's bilateral trade is any different from other regions. They find significant evidence to support the view that restrictive trade policies have contributed to low levels of bilateral trade between African and industrial countries. However, in terms of the level of North-South trade in the early 1990s, Africa's trade with the north is not atypical. In fact, the level of trade is higher than would be expected from various determinants of bilateral trade. In terms of changes over time however, Africa's trade is in fact unusual, with a trend decline in trade over the last 25 years. Africa has historically under-traded with North America, while developing Asian and Latin American countries have tended to over-trade with North America and under-trade with Europe. They conclude that Africa's trade is not unusual, when controlling for various determinants of trade. What is unusual is that Africa over-traded with the north relative to other developing countries in the early 1970s, but that degree of over-trading has declined over the past 25 years. The results also points to more scope for trade among African countries.

Al-Atrash and Yousef (2000) apply the gravity model to address the issue whether intra-Arab trade is too little. Their results indicate that intra-Arab trade and Arab trade with the rest of the world are lower than what would be predicted by the gravity equation. While some of the reasons for the low level of trade are policy related, such as high tariffs or trade and political impediments, others are due to lack of product complementarity and differences in income levels. Their results suggest that there is considerable scope for intraregional and multilateral trade.

Subramanian and Tamirisa (2001) explore Africa's trade in its entirety, i.e., Africa's trade, trade with other African countries, and with other developed and developing countries. The authors further disaggregate the African continent into Francophone and Anglophone regions. The results support the argument that Africa suffers from marginalization in trade. In particular, Francophone Africa is a serious under-trader and this has increased over time. Anglophone Africa is an average trader, but these countries have not been keeping pace with global trade growth. Africa's trade with the north has suffered the most. Since trade with the north constitutes the largest share of Africa's trade, the impact on growth is large. When compared to other developing countries, the disparity is even more striking, as other regions have increased their share of trade and globalization.

III. CARICOM: Historical Background and Main Features

The Caribbean Community (CARICOM) was created at a Heads of Government Conference in Trinidad and Tobago in 1963. CARICOM was subsequently combined with the Caribbean Free Trade Association (CARIFTA), by the Treaty of Chaguaramas on July 4, 1973. Its objectives were to foster economic integration among member states through the creation of a common market, involving the free movement of goods, services, people, and capital. Other objectives included the coordination of foreign policies, particularly in relation to the major trading partners, and to pool scarce resources in the areas of health, education, communication, and response to natural disasters. Despite the stated aim of a common market, the initial treaty did not cover all these issues, instead focusing on the free flow of goods and the implementation of a common external tariff. The treaty did not set clear guidelines for the liberalization of services and movement of labor.

In the 1990s, efforts to achieve greater integration were revitalized with the goal of establishing a CARICOM Single Market and Economy (CSME), which not only envisaged a fully functioning common market, but also coordination of macroeconomic policies and eventual monetary integration. Much remains to be done to achieve the objective of a common market. Some of the obstacles to integration have been due to the distinctive characteristics of CARICOM economies, while others have been to due to policy-induced factors. We discuss some of these features next.

Small open economies—the average population for a country in the region is around one-half million inhabitants. The total population is about 6 million, which is quite small. All the countries, except Guyana and Suriname, have land areas of less than 30,000 square kilometers. The annual output of CARICOM was US$23 billion in 2000. Half the countries had GDP figures of less than US$800 million. CARICOM members also have highly open economies, with the average ratio of trade to GDP of about 80 percent in 2000 (Table 1).

Undiversified export base—Most CARICOM countries lack a diversified economic base, with the majority of countries dependent on primary products, tourism, and, increasingly, financial services. Merchandise exports consist of primary products, such as sugar, bananas, and petroleum and natural gas in the case of Trinidad and Tobago. The narrow export base has been supported in the past by preferential trade agreements with North America and the EU. These arrangements would eventually be phased out in accordance with WTO trade liberalization regulations.

Lack of product complementarity—A major reason contributing to the low level of intraregional trade has been the lack of product complementarity. CARICOM countries tend to specialize in one or two products mostly traded with non-CARICOM countries. This obviously reduces the scope for intraregional trade.

Table 1. CARICOM Selected Economic Indicators : 1980-2000

	Averages				Averages			
	1980-84	1985-89	1990-94	1995-00	1980-84	1985-89	1990-94	1995-00
	GDP (US$ millions)				Real GDP growth (%)			
Barbados	998	1442	1662	2202	0.3	3.2	-1.6	3.3
Belieze	191	278	479	648	1.0	7.8	5.7	4.1
Dominica	73	127	191	249	10.7	4.8	2.8	1.8
Grenada	86	150	245	336	1.3	5.5	2.4	5.2
Guyana	710	522	397	697	-3.3	-0.6	5.5	3.3
Jamaica	3021	3087	4778	7225	1.7	2.9	2.0	-0.4
St. Kiits & Nevis	55	97	185	279	4.1	7.1	3.7	4.8
St. Lucia	156	294	464	617	3.5	9.4	3.5	2.2
St. Vincent & the Grenadines	83	144	225	304	5.5	6.9	3.0	4.0
Trinidad &Tobago	7302	5167	4995	6230	-2.3	-3.3	0.9	4.5
Total	**12676**	**11307**	**13620**	**18787**	**2.3**	**4.4**	**2.8**	**3.3**
	Population ('000)				CPI Inflation (%)			
Barbados	250	250	250	255	10.7	3.9	3.3	2.5
Belieze	154	175	198	227	6.8	2.3	2.5	1.5
Dominica	76	80	75	80	11.3	4.0	3.1	1.6
Grenada	94	93	95	116	11.9	2.2	2.9	1.7
Guyana	749	757	749	757	19.5	36.2	43.5	6.8
Jamaica	2215	2336	2406	2519	16.4	17.9	41.7	12.1
St. Kiits & Nevis	44	42	43	43	7.8	1.8	2.9	3.8
St. Lucia	134	144	155	169	8.3	2.8	3.6	2.9
St. Vincent & the Grenadines	110	112	110	112	9.1	1.9	4.4	1.7
Trinidad &Tobago	1124	1208	1278	1317	14.7	9.1	7.6	4.5
Total	**4951**	**5197**	**5359**	**5594**	**11.6**	**8.2**	**11.6**	**3.9**
	Exports & Imports (% GDP)				Real Per Capita Income (US$ Current)			
Barbados	82.1	56.9	45.8	51.2	3994	5767	6646	8626
Belieze	96.0	94.5	85.9	80.5	1239	1581	2407	2852
Dominica	99.0	88.2	79.0	65.0	966	1579	2549	3153
Grenada	94.1	85.5	63.7	63.5	920	1601	2579	3034
Guyana	89.6	104.7	165.4	161.5	949	690	531	921
Jamaica	71.1	68.7	67.4	63.5	1365	1320	1984	2862
St. Kiits & Nevis	126.9	110.1	70.6	66.3	1244	2321	4320	6466
St. Lucia	106.7	87.4	82.3	60.6	1162	2026	2984	3646
St. Vincent & the Grenadines	114.5	110.3	82.5	66.2	750	1280	2054	2712
Trinidad &Tobago	59.6	53.4	63.1	88.1	6489	4292	3909	4726
Average	**94.0**	**86.0**	**80.6**	**76.6**	**1908**	**2246**	**2996**	**3900**
	Government balance (% GDP)				Foreign reserves (US$ millions)			
Barbados	-6.0	-3.9	-0.8	0.1	112	137	138	319
Belieze	-4.8	-0.2	-4.8	-4.7	10	38	50	66
Dominica	-5.9	1.7	-3.0	-4.9	4	11	18	26
Grenada	-12.4	-7.9	-4.1	-3.4	13	19	24	45
Guyana	-16.9	-30.1	-12.9	-3.1	9	8	167	294
Jamaica	-13.8	-3.8	3.3	-5.9	92	138	350	760
St. Kiits & Nevis	-4.9	-10.7	1.2	-4.2	3	11	24	41
St. Lucia	-4.8	1.8	2.0	1.9	9	28	53	67
St. Vincent & the Grenadines	3.9	2.3	-0.2	-1.0	8	21	29	38
Trinidad &Tobago	-10.6	-6.2	0.5	-1.4	2536	435	315	790
Average	**-7.6**	**-5.7**	**-1.9**	**-2.7**	**280**	**85**	**117**	**245**

Sources: IMF, World Economic Outlook Database, and authors' calculations

Protective trade policies—The structure of trade policies has been an impediment to increased trade within the CARICOM, as well as trade with other countries or regions. While member countries have viewed the CET as a means of protecting local industries and fostering intra-CARICOM trade, they have increasingly acknowledged that high CET rates have been one of the factors that have made exports uncompetitive. The lowering of the CET has subsequently gathered momentum, and in 1991, the original tariff was reduced from a range of 0–70 percent to 0–45 percent. In 1992, member countries agreed to a program of tariff reduction of over five years, targeting a final CET in the 0–20 percent range. However, up to now, the lowering of the CET has not yet been fully implemented.

Regional subgroupings—The Eastern Caribbean Currency Union (ECCU) is an important subgrouping in the region.[3] The principal objective of the ECCU has been the maintenance of a fixed exchange rate regime, which has been central to price stability in the union. While ECCU members have not initiated ECCU-specific trading arrangements, the impact of the currency union on intra-CARICOM trade is worth investigating.

[3] The ECCU comprises Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines.

IV. Data and Econometric Issues

A. Data Issues

The data used was obtained from the IMF's *Direction of Trade Statistics* and the CARICOM Secretariat (see Appendix II). The sample covers 31 entities encompassing 44 countries during the 1980–99 period. CARICOM countries retained in the sample are those that have been members of the group for the entire time period under study. However, smaller members that are British territories, such as Montserrat, were dropped, since their trade records are patchy. EU countries were collapsed into one single group because the factors that determine these countries' intra- and inter-group trade are not particularly relevant to studying trade in a developing entity such as CARICOM. For benchmarking purposes, it suffices to capture trade between the EU as a group and the rest of the world. In addition, collapsing EU countries into one entity significantly reduces the size of the data matrix and thus the computation power, with negligible loss of inference. The United Kingdom was treated separately because of its status as the former colonial power for most CARICOM members and the special relationship that it maintains with them. The other countries included in the study were chosen to be representatives of their regions. The entities included in the study are detailed in Appendix II.

The fact that trade data do not capture services and notably tourism receipts, one of CARICOM's major sources of foreign earnings, is obviously a problem. Trade data reported in the IMF's *Direction of Trade Statistics* are captured at the customs level. Services are assessed using other methods such as surveys. Data on CARICOM tourism, in particular, are not compiled with the degree of detail that would allow bilateral country comparisons. More fundamentally, the gravity model is ill-suited for analyzing tourism. The Caribbean is an attractive destination for tourists from all over the world. Transportation costs tend to be inversely related to the volume of traffic to a destination and thus do not necessarily increase with distance (the exact opposite of the gravity model hypothesis). This is not to say that transportation costs are not a strong determinant of tourism. Rather, whether transportation to a destination is expensive or not has little to do with its remoteness. In fact, the analysis of service transactions would require an entirely different framework, which is beyond the scope of this paper.

B. Methodology and Econometric Issues

The main objective of the empirical analysis is to test whether CARICOM has been trade creating or trade diverting. These two outcomes are not necessarily mutually exclusive. Whether CARICOM countries trade more with other countries or among themselves is not necessarily relevant as long as the region is able to achieve its full growth potential. However, one of the objectives of the founders of CARICOM was to foster regional trade integration and the results would allow us to verify whether this is actually taking place.

The gravity model is used to test if membership in the CARICOM has had a positive or negative impact on intra regional and/or interregional trade over the last 20 years. The

product complementarity hypothesis, i.e., whether it is beneficial for countries producing similar products to engage in trade integration is also assessed. The analysis examines how the presence of the ECCU over these years has affected CARICOM's trade. Recently, following WTO rulings, the banana regime under which bananas from ACP countries were exported to the EU was loosened to allow greater access to the EU for bananas from Latin America. The impact of this change on CARICOM trade will be investigated. Finally, CARICOM has implemented trade liberalizing measures whose impact will also be gauged. At the same time, developments in interregional trade between CARICOM and other regions would provide evidence on CARICOM and globalization.

To analyze regional trade effects, dummy variables were created for each regional trading arrangement taking one for pairs of members and zero otherwise. A positive coefficient on the dummy variable indicates that the two member countries trade more with one another than predicted by their incomes, populations, and distance. This is interpreted as suggesting that the arrangement is trade creating. A negative coefficient on these dummy variables or a positive coefficient on dummy variables pairing members of the arrangement and nonmembers indicates that the arrangement is trade diverting. Other dummy variables capturing the effects of language and cultural similarities, being a primary product exporters, and other trading or economic groups were added. Appendix I provides a description of the variables.

A gravity equation was estimated on five points (1980, 1985, 1990, 1995, and 1999) and on averages over four periods (1980–84, 1985–89, 1990–94, and 1995–99) using OLS and Tobit methods. By covering a broad range of possibilities, the objective of this approach primarily is to infer the dynamics of CARICOM trade over the last 20 years. Point estimations take snapshots of the impact of CARICOM on the region's trade, whereas averages summarize developments over five years. Both approaches have advantages and drawbacks.

Point estimates avoid the crucial problem that affect dynamic gravity equations i.e., the upward bias in the coefficient resulting from lack of proper deflation of the nominal trade data that is compiled. Recent studies have deflated trade data using a U.S. price deflator (e.g., Rose, 2002). However, such a deflator is not appropriate for bilateral trade data not involving the United States. The main problem with points is the inherent inability of cross-section estimates to infer the dynamics. Moreover, if the year chosen turns out to be an outlier, any inference based on several point estimates could be downright wrong. The problem is worst in the gravity model context because a specific event (say, an earthquake, famine, or civil strife) in one or several countries included for benchmarking purposes could prevent drawing any conclusion when comparing cross-section trade estimates over individual years (the approach adopted for instance by Subramanian and Tamirisa, 2001).

Average estimates, on the other hand, make it possible to use the totality of the information over the 20-year period under study. A five-year period is long enough to greatly mitigate the impact of outliers without losing the effect of fundamental changes that could explain developments in trade growth. Because business cycles may not be the same in different parts of the world averages, by smoothing the data, greater robustness of the estimates is

ensured. Furthermore, as the lack of a proper deflation assigns more weight to the data from the most recent years, averages thus reduce the upward bias in estimated coefficients. Averaging does not eliminate that bias, however. Finally, averaging also reduces significantly the size of the matrix and thus the computation time.

We estimate the log-linear version of the gravity model, but since this eliminates all zero observations and gives a disproportionate weight to small observations, we modify the trade variable as suggested by Eichengreen and Irwin (1995, 1997). The dependent variable is expressed as $\ln(1+TRADE_{ij})$, where $TRADE_{ij}$ is the nominal value of bilateral trade between country i and j. For large values of $TRADE$, $\ln(1+TRADE_{ij}) \approx \ln(TRADE_{ij})$ and small values $\ln(1+TRADE_{ij}) \approx TRADE_{ij}$, which approximate the semi-log Tobit relationship, while keeping the zero observations.

C. Descriptive Statistics

CARICOM trades heavily with the rest of the world (almost 90 percent of its total trade), consistent with the openness of the region's economies (Table 1). Among CARICOM regional partners, North America is by far the largest, followed by the EU. CARICOM's intratrade owes mostly to the largest economies in the region, namely Barbados, Guyana, Jamaica, and Trinidad and Tobago. The latter's trade with the rest of the region has been declining, reflecting the decline in its provision of cheap oil to its neighbors, whereas Guyana's and Jamaica's trade with the other CARICOM member countries has mirrored the fortunes of their economies that have gone through severe crises (Table 2).

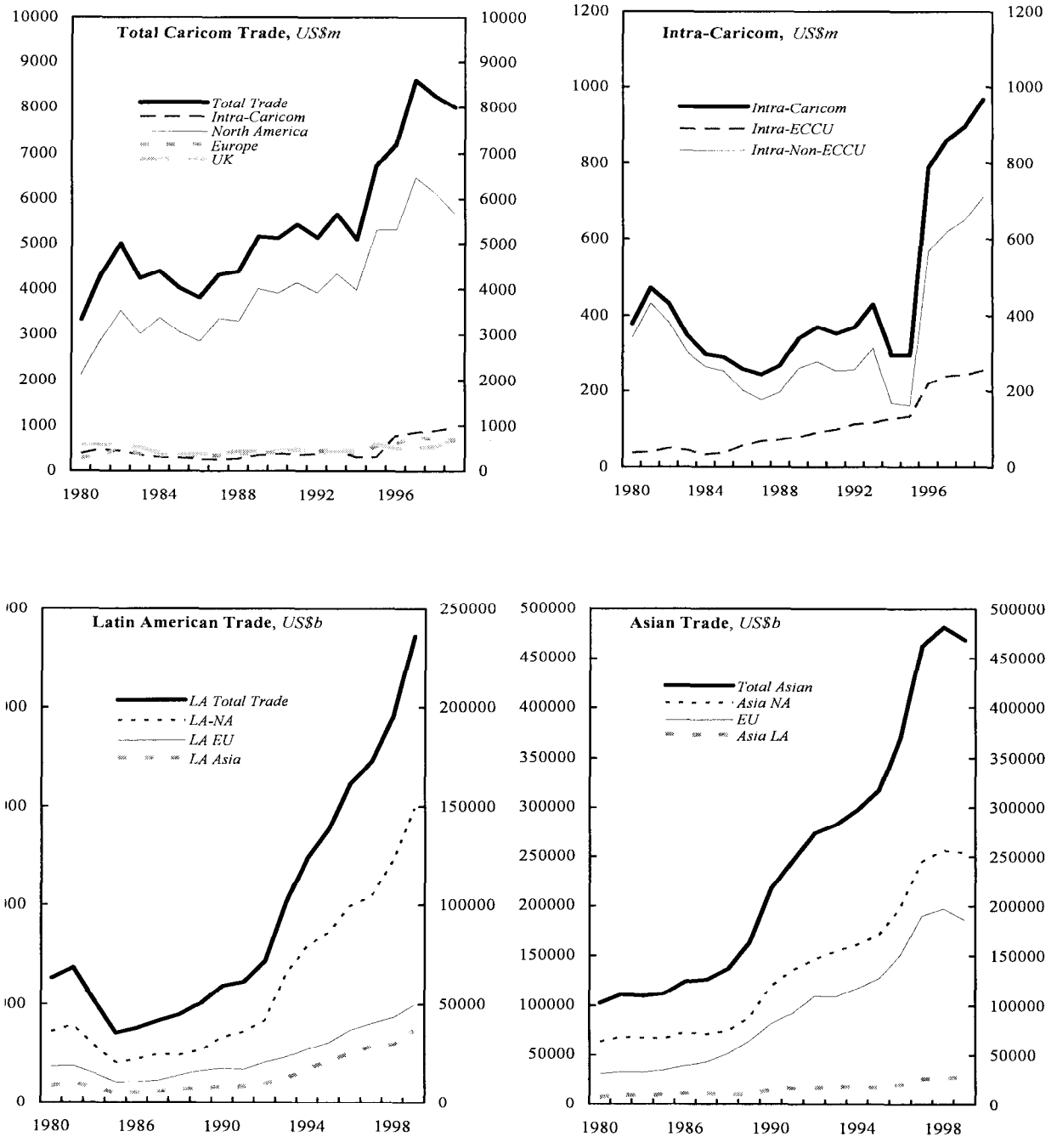
In comparison to other developing and emerging regions, Figure 1 reveals that CARICOM total trade over the 20-year period has increased significantly, albeit less steadily. The variations in CARICOM trade may reflect a greater sensitivity to exogenous shocks, as the region has repeatedly suffered over the period from several natural disasters, notably hurricanes. The small export base is another factor that instills significant disturbance in CARICOM trade data, as an exogenous shock could mean the loss of close to all export receipts for some countries. Clearly, intratrade would be affected the most by shocks, as countries preferably seek to sell outside the region and earn hard currency. Because, the ECCU has been successful in maintaining a strong peg to the U.S. dollar, intra-ECCU trade is less prone to sharp variations.

Table 2. CARICOM Average Trade

	1980-85	1985-90	1990-95	1995-99	Total
	(millions of U.S. dollars)				
Intra-CARICOM trade					
Barbados	84.1	78.1	142.4	107.6	412.2
Belize	2.3	5.4	37.3	17.9	62.8
Dominica	11.5	17.9	25.3	19.2	73.9
Grenada	15.6	18.6	31.0	10.3	75.5
Guyana	103.1	35.0	43.9	111.2	293.2
Jamaica	78.0	55.9	75.0	248.3	457.2
St Kitts and Nevis	9.0	11.9	18.1	13.8	52.8
St Lucia	22.1	29.7	54.5	28.5	134.9
St Vincent and the Grenadines	15.3	18.4	31.9	13.5	79.1
Trinidad and Tobago	139.9	70.1	68.7	63.9	342.5
Total intra-Caricom Trade	**481.0**	**341.1**	**528.0**	**634.2**	**1,984.3**
CARICOM trade with					
European Union (without United Kingdom)	476.8	339.5	794.4	934.9	2545.6
United Kingdom	505.4	537.3	686.2	679.0	2,407.8
North America	2,655.0	1,774.1	2,606.5	2,722.8	9,758.5
Asia	34.6	51.9	105.4	120.5	312.5
Latin America	292.7	216.9	501.1	693.0	1,703.7
Total	3,964.6	2,919.7	4,693.7	5,150.2	16,728.1
Total CARICOM world trade	**4,445.6**	**3,260.8**	**5,221.7**	**5,784.3**	**18,712.4**
	(in percent of total trade)				
Barbados	17.5	22.9	27.0	17.0	20.8
Belize	0.5	1.6	7.1	2.8	3.2
Dominica	2.4	5.2	4.8	3.0	3.7
Grenada	3.3	5.5	5.9	1.6	3.8
Guyana	21.4	10.3	8.3	17.5	14.8
Jamaica	16.2	16.4	14.2	39.1	23.0
St Kitts and Nevis	1.9	3.5	3.4	2.2	2.7
St Lucia	4.6	8.7	10.3	4.5	6.8
St Vincent and the Grenadines	3.2	5.4	6.0	2.1	4.0
Trinidad and Tobago	29.1	20.5	13.0	10.1	17.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
European Union (without United Kingdom)	12.0	11.6	16.9	18.2	15.2
United Kingdom	12.7	18.4	14.6	13.2	14.4
North America	67.0	60.8	55.5	52.9	58.3
Asia	0.9	1.8	2.2	2.3	1.9
Latin America	7.4	7.4	10.7	13.5	10.2
Total	100.0	100.0	100.0	100.0	100.0
Total Caricom intra-trade (% of total trade)	10.8	10.5	10.1	11.0	10.6
Total CARICOM trade with other (% of total)	89.2	89.5	89.9	89.0	89.4
Total Caricom world trade	100.0	100.0	100.0	100.0	100.0

Sources: CARICOM Secretariat, IMF, *Direction of Trade Statistics*, and authors' calculations.

Figure 1. Regional Trade Indicators, 1980-99



Source: IMF's *Direction of Trade Statistics.*

V. ESTIMATION RESULTS

A. Results

We estimate the baseline model on a pooled panel of average trade using the modified trade variable and testing for several interesting features. The results reported in Table 3 show that, whatever the controls, **common CARICOM membership has had a positive impact on bilateral intratrade**. This is a very interesting result considering the odds, such as the lack of common land borders, undiversified export base, strong attractiveness of North America, trade liberalization, and so forth. The straightforward implication is that further regional integration would allow the region to realize its full intratrade potential, and thus its growth potential.

The elasticities of GDP, population, and distance with respect to trade have the expected signs and are comparable to what similar studies have found, but are generally lower than previous studies. For example, GDP elasticities are between 0.76 and 0.88, as opposed to elasticities larger than one in many previous studies, whereas population elasticities are all lower than 0.35. These results suggest that averaging the data does reduce the upward bias in the coefficients.

There seems to be a positive intra-ECCU trade impact even after accounting for joint membership in the CARICOM. However, after controlling for other factors, notably the banana regime, trade liberalization, and economic trading groups, the ECCU effect becomes insignificant in the general model.

Changes in the banana regime taking the form of gradual increases in access to non-ACP bananas in the EU, has negatively affected CARICOM trade, even after controlling for the positive impact exhibited by being an ACP member and other factors. At the same time, "dollar-banana" producers recorded a positive impact on their trade. This is not surprising given the importance of bananas in several CARICOM countries' trade. When isolating CARICOM's banana trade with the United Kingdom from that with the rest of the EU, it appears that access to CARICOM bananas in the United Kingdom is no different from the rest of the EU.

Table 3. Baseline Model Broken Down (Pooled Panel of Logarithm of Average Trade Modified)

	Basic CARICOM		ECCB		Banana		EU Banana	Trade liberalization		Economic and trading groups		Primary producers	Regions in relation to CARICOM		General model	
	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1	lAvtrade1
lAvGDP	0.771	0.821	0.847	0.821	0.826	0.823	0.81	0.835	0.842	0.819	0.818	0.909	0.783	0.765	0.921	0.873
	(0.017)**	(0.017)**	(0.016)**	(0.017)**	(0.017)**	(0.017)**	(0.17)**	(0.017)**	(0.017)**	(0.017)**	(0.017)**	(0.017)**	(0.018)**	(0.018)**	(0.018)**	(0.019)**
lAvpop	-0.184	-0.244	-0.309	-0.241	-0.268	-0.26	-0.25	-0.261	-0.248	-0.263	-0.261	-0.344	-0.279	-0.238	-0.269	-0.306
	(0.023)**	(0.024)**	(0.018)**	(0.024)**	(0.024)**	(0.024)**	(0.02)**	(0.024)**	(0.025)**	(0.023)**	(0.023)**	(0.018)**	(0.019)**	(0.019)**	(0.023)**	(0.019)**
ldistance	-0.565	-0.584	-0.68	-0.576	-0.585	-0.579	-0.57	-0.587	-0.589	-0.576	-0.569	-0.663	-0.697	-0.567	-0.507	-0.513
	(0.025)**	(0.027)**	(0.025)**	(0.028)**	(0.027)**	(0.027)**	(0.03)**	(0.027)**	(0.027)**	(0.027)**	(0.028)**	(0.024)**	(0.023)**	(0.027)**	(0.028)**	(0.028)**
caricom	1.632	1.193		1.169	1.129	1.167	1.2	1.582	1.604	1.185	1.166			1.167	1.762	1.537
	(0.086)**	(0.103)**		(0.102)**	(0.103)**	(0.103)**	(0.11)**	(0.104)**	(0.104)**	(0.102)**	(0.101)**			(0.093)**	(0.101)**	(0.094)**
caother	0.312	0.118		0.137	0.027	0.078	0.1	0.097	0.154	0.007	0.023				0.299	
	(0.069)**	-0.074		(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.075)*	(0.07)	(0.08)				(0.076)**	
english		0.667	0.84	0.663	0.667	0.693	0.66	0.68	0.71	0.632	0.629	0.916	0.751	0.573	0.785	0.733
		(0.051)**	(0.045)**	(0.051)**	(0.050)**	(0.050)**	(0.05)**	(0.051)**	(0.053)**	(0.050)**	(0.050)**	(0.044)**	(0.054)**	(0.056)**	(0.051)**	(0.058)**
spanish		0.371	0.139	0.395	0.358	0.364	0.392	0.358	0.345	0.37	0.39	0.041	0.255	0.47	0.383	0.384
		(0.125)**	(0.12)	(0.127)**	(0.124)**	(0.123)**	(0.12)**	(0.124)**	(0.125)**	(0.124)**	(0.126)**	(0.12)	(0.117)*	(0.121)**	(0.131)**	(0.127)**
eccb			0.59	0.252			0.23				0.205				0.17	-0.07
			(0.110)**	(0.106)*			(0.17)				(0.11)				(0.09)	(0.09)
primary												0.623			-0.355	0.811
												(0.056)**			(0.051)**	(0.058)**
acp					1.15	1.159	1.12			1.077	1.072				-0.464	1.025
					(0.085)**	(0.085)**	(0.13)			(0.084)**	(0.084)**				(0.094)**	(0.111)**
comesa										0.332	0.335				0.397	0.331
										(0.126)**	(0.125)**				(0.078)**	(0.153)*
cet9094								-0.686	-0.701						1.077	-0.644
								(0.090)**	(0.091)**						(0.272)**	(0.100)**
cet9599								-1.122	-0.978							-0.948
								(0.102)**	(0.110)**							(0.113)**
WTO									-0.195							-0.247
									(0.051)**							(0.050)**
eubanana					-0.392	-0.394										-1.154
					(0.094)**	(0.094)**										(0.120)**
ukbanana							-0.06									
							(0.26)									
nonukeubanana							-0.402									
							(0.26)									
dollarba						0.454	0.46									-0.002
						(0.082)**	(0.10)**									-0.09
africa1													-1.275	-0.492	0.777	-1.499
													(0.582)*	-0.604	(0.057)**	(0.571)**
asia													0.793	0.954	1.229	2.243
													(0.48)	(0.471)*	(0.087)**	(0.460)**
eu													19.083	19.989	0.448	19.955
													(1.555)**	(1.508)**	(0.137)**	(1.845)**
na													6.362	9.265	-0.717	13.254
													(1.866)**	(1.818)**	(0.097)**	(1.959)**
latam													-0.274	0.031	-0.942	0.223
													(0.28)	(0.28)	(0.113)**	(0.27)
Constant	2.567	2.499	3.502	2.406	2.59	2.457	2.34	2.512	2.498	2.543	2.466	2.915	3.865	2.624		1.548
	(0.216)**	(0.243)**	(0.222)**	(0.258)**	(0.242)**	(0.245)**	(0.25)**	(0.241)**	(0.242)**	(0.244)**	(0.259)**	(0.216)**	(0.206)**	(0.243)**		(0.261)**
No. of obs	3720	3720	3720	3720	3720	3720	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720
R-squared	0.73	0.74	0.73	0.74	0.74	0.75	0.75	0.74	0.74	0.74	0.74	0.74	0.74	0.75	0.76	0.77

Note: Robust standard errors in parentheses.
* significant at 5%; ** significant at 1%.

The lowering of the CET has been trade diverting (negative coefficient), resulting in higher trade with the rest of the world. This, however, does not mean that the reduction of the CET has had a negative impact on CARICOM's trade. Rather, it has resulted in higher total trade for CARICOM since the arrangement remains trade creating among its member countries (as illustrated by the positive CARICOM coefficient). This further implies that there is untapped potential for higher intratrade, implying that further regional integration is warranted. In addition, the lowering of intraregional tariff barriers has played a catalytic role in spurring regional trade.

Trade liberalization proxied by WTO membership had a negative impact on trade, suggesting that the WTO has yet to positively affect world trade. CARICOM trade with other regions has increased, except trade with Africa (which declined) and Latin America (the coefficient is not significant). The main foreign trading partner regions of CARICOM appear to be North America, Europe, and Asia. The striking result here is that trade with the neighboring Latin American region is insignificant, which may be partly explained by the language and cultural barriers and the fact that both the CARICOM and Latin America are primary producers. More generally, economic and trading groups seem to be trade creating as the results suggest for COMESA and ACP. Language and, by extension, cultural ties have a strong positive effect on trade for both English-speaking and Spanish-speaking countries.

B. Robustness of the Results

a. Estimations on average trade over five-year periods

We proceed to estimate the gravity model of trade on average data per period and for the years chosen. Starting with averages, the gravity model was fitted on the pooled panel and period averages, with the dependent variable being, alternatively, bilateral trade and bilateral trade modified, as in the baseline model presented in Table 3. OLS and Tobit estimations were performed alternatively. Period averages were constructed: 1980–84, 1985–89, 1990–94, and 1995–99. The model estimated includes standard gravity model variables, namely product of income, product of population, distance, and the following dummy variables to capture relevant trading arrangements and features: Intra-CARICOM trade; CARICOM trade with other regions; English-speaking and Spanish-speaking trading partners; ECCB members; primary producers; WTO members; dollar banana producers; banana producers with preferential EU access; ACP and COMESA members. A detailed description of the variables is given in Appendix I.

Table 4 presents the results from the OLS estimations. Equation [4.1] is the pooled panel of averages. Equations [4.2] to [4.5] are the regressions for each of the periods. The results in Equations [4.1] through [4.5] are in line with theory and findings in the literature. Overall, all the equations are well specified with adjusted R-square in the 75–80 percent range. The coefficient on the product of average income is highly significant and correctly signed. The elasticities of the income coefficient suggest that a 1 percent increase in income raises trade by around 1.4 percent in the pooled panel equation.

Table 4. Average Trade, OLS

		Averages Without Trade Liberalization				Average With Trade Liberalization	
	Pooled Panel	1980-84	1985-89	1990-94	1995-99	Pooled Panel	1990-94
Dependent variable: Log average trade	[4.1]	[4.2]	[4.3]	[4.4]	[4.5]	[4.6]	[4.7]
LAvGDP	1.327	1.481	1.485	1.411	1.487	1.346	1.405
	(0.027)**	(0.055)**	(0.059)**	(0.049)**	(0.052)**	(0.027)**	(0.049)**
Lavpop	-0.298	-0.588	-0.514	-0.41	-0.449	-0.331	-0.392
	(0.037)**	(0.081)**	(0.088)**	(0.067)**	(0.070)**	(0.037)**	(0.068)**
Ldistance	-1.223	-1.315	-1.236	-0.976	-1.355	-1.231	-1.028
	(0.048)**	(0.092)**	(0.103)**	(0.088)**	(0.096)**	(0.048)**	(0.089)**
Intra-CARICOM	3.474	2.902	3.144	3.955	2.859	3.884	4.682
	(0.181)**	(0.359)**	(0.387)**	(0.360)**	(0.382)**	(0.189)**	(0.558)**
Caother	0.252	-0.409	-0.013	-0.088	0.405	0.193	-0.051
	-0.146	-0.276	-0.303	-0.262	-0.283	-0.145	-0.262
English	0.321	0.46	0.543	0.138	0.25	0.314	0.15
	(0.095)**	(0.201)*	(0.193)**	-0.172	-0.17	(0.095)**	-0.172
Spanish	0.623	0.121	0.402	0.772	1.094	0.62	0.729
	(0.193)**	-0.4	-0.411	-0.394	(0.358)**	(0.192)**	-0.393
Eccb	0.535	0.209	0.654	0.177	0.691	0.559	0.415
	(0.191)**	-0.396	-0.36	-0.305	-0.404	(0.183)**	-0.307
Primary	-0.012	0.038	-0.029	0.71	-0.031	-0.018	0.622
	-0.139	-0.27	-0.283	(0.267)**	-0.278	-0.138	(0.267)*
WTO	-0.401	0.26	-0.053	-0.122	0.59	-0.278	-0.167
	(0.096)**	-0.2	-0.215	-0.198	-0.308	(0.101)**	-0.198
Dollarba	0.322	0.377	0.355	0.074	0.306	0.331	0.064
	(0.148)*	-0.284	-0.314	-0.211	-0.319	(0.150)*	-0.21
Eubanana	0.712	0.937	0.584	0.834	0.463	0.727	0.799
	(0.125)**	(0.306)**	(0.209)**	(0.196)**	(0.174)**	(0.126)**	(0.194)**
ACP	1.847	1.652	1.942	1.579	-0.319	1.846	1.579
	(0.105)**	(0.183)**	(0.164)**	(0.149)**	-0.443	(0.106)**	(0.148)**
Comesa	1.273	0.226	1.383	0.801	1.806	1.242	0.794
	(0.128)**	-0.685	(0.588)*	-0.521	(0.149)**	(0.129)**	-0.515
Cet9094						-0.634	-1.008
						(0.172)**	(0.491)*
Cet9599						-1.366	
						(0.248)**	
Constant	3.426	5.119	3.231	1.196	2.497	3.463	1.637
	(0.454)**	(0.871)**	(1.013)**	-0.907	(0.863)**	(0.452)**	-0.909
No. of observations	2,749	662	705	636	746	2,749	636
Adjusted R-squared	0.77	0.8	0.78	0.8	0.78	0.78	0.8

Notes: Robust standard errors in parentheses
* significant at 5 percent; ** significant at 1 percent

The coefficients on the income variable in all these equations nevertheless seem to exhibit an upward bias, which is reduced when estimating the same model with the modified trade variable as the dependent variable (Table 5). In both Tables 4 and 5, the coefficients on population are correctly signed and significant, i.e., an increase in the product of average populations reduces the amount of bilateral trade. Likewise, distance is highly significant and correctly signed.

The intra-CARICOM trade variable is significant and positive in the panel and period averages, implying that even after controlling for other regional trading arrangements, linguistic effect, and trade liberalization measures, CARICOM membership has a positive and significant effect on trade. Furthermore, it appears that the impact of CARICOM has increased between 1980 and 1994, before tapering off somewhat. Trade between CARICOM and other regions is positive in the panel average equation and in the 1995–99 period only (Table 5), reflecting the fact that significant trade liberalization is relatively recent in the region.

The English-speaking dummy variable is significant in the panel and in the "1980s." The variable loses significance in the 1990s, perhaps reflecting a decline in trade arising from "colonial" ties. The Spanish-speaking dummy variable is also positive but significant only in the panel regression and in the 1995–99 period. Moreover, the size of this coefficient increase over time, possibly indicating the increase in trade among Spanish-speaking countries.

Trade among the ECCB countries is positive and significant in the panel regression, excluding the dummy measuring the reduction of the CET (Table 4) and not at all when the dependent variable is modified trade (Table 5), which is consistent with the baseline model of Table 3.

The dummy variable for primary producers did not produce any significant results, perhaps due to the low level of trade between primary producers. This confirms the product complementarity it hypothesis, that countries which produce similar products, in this case primary products, are unlikely to trade among themselves. The sign of the coefficient of the WTO dummy variable is negative in the panel regression, contrary to expectations, while the sign on the dollar banana variable is positive for the panel, but not for individual periods. The EU banana variable is significant and has a positive sign, indicating the importance of the preferential market access to the EU for CARICOM banana. The almost halving of this coefficient shows the decline in trade and market access in recent years with the change in the banana trading regime.

In both Tables 4 and 5, the ACP dummy exhibits positive effects on trade in the panel and most periods. The COMESA dummy, which represents trading in the COMESA region, becomes significant in the late 1990s. The size of the coefficient increases nearly nine fold, implying increased trade within this regional trading arrangement.

The impact of external trade liberalization in the CARICOM, as proxied by the reduction of the CET, shows that the latter has been trade diverting (albeit not trade reducing,

Table 5. Average Modified Trade, OLS

		Averages Without Trade Liberalization				Average With Trade Liberalization	
	Pooled Panel	1980–84	1985–89	1990–94	1995–99	Pooled Panel	1990–94
Dependent variable: Log average trade	[5.1]	[5.2]	[5.3]	[5.4]	[5.5]	[5.6]	[5.7]
LAvGDP	0.911	0.957	0.991	1.062	1.039	0.921	1.056
	(0.018)**	(0.037)**	(0.035)**	(0.036)**	(0.035)**	(0.018)**	(0.036)**
Lavpop	-0.252	-0.438	-0.414	-0.356	-0.347	-0.269	-0.344
	(0.023)**	(0.048)**	(0.047)**	(0.049)**	(0.046)**	(0.023)**	(0.050)**
Ldistance	-0.504	-0.427	-0.44	-0.561	-0.54	-0.507	-0.588
	(0.029)**	(0.054)**	(0.054)**	(0.058)**	(0.056)**	(0.028)**	(0.060)**
Intra-CARICOM	1.429	1.009	1.1	1.532	1.353	1.762	2.088
	(0.102)**	(0.188)**	(0.180)**	(0.212)**	(0.217)**	(0.101)**	(0.259)**
Caother	0.328	-0.085	0.041	0.278	0.358	0.299	0.294
	(0.076)**	-0.139	-0.139	-0.154	(0.159)*	(0.076)**	-0.155
English	0.78	0.907	0.893	0.884	0.676	0.785	0.891
	(0.051)**	(0.108)**	(0.093)**	(0.096)**	(0.092)**	(0.051)**	(0.097)**
Spanish	0.39	0.176	0.03	0.608	0.758	0.383	0.572
	(0.131)**	-0.259	-0.252	(0.271)*	(0.257)**	(0.131)**	(0.270)*
Eccb	0.132	0.199	0.122	-0.184	0.179	0.17	-0.003
	-0.104	-0.143	-0.153	-0.178	-0.199	-0.089	-0.181
Primary	0.78	0.774	0.814	1.085	0.946	0.777	1.057
	(0.058)**	(0.107)**	(0.106)**	(0.117)**	(0.127)**	(0.057)**	(0.117)**
WTO	-0.405	0.084	-0.064	-0.243	-0.139	-0.355	-0.264
	(0.049)**	-0.111	-0.095	(0.109)*	-0.144	(0.051)**	(0.110)*
Dollarba	0.394	0.565	0.421	0.168	0.506	0.397	0.162
	(0.078)**	(0.141)**	(0.142)**	-0.159	(0.148)**	(0.078)**	-0.159
Eubanana	-0.463	-0.986	-0.498	-0.367	-0.242	-0.464	-0.382
	(0.094)**	(0.251)**	(0.150)**	(0.148)*	-0.145	(0.094)**	(0.147)**
ACP	1.234	1.053	1.069	1.04	2.067	1.229	1.036
	(0.087)**	(0.159)**	(0.161)**	(0.159)**	(0.332)**	(0.087)**	(0.158)**
Comesa	0.466	-0.906	-0.429	-0.624	1.086	0.448	-0.658
	(0.136)**	(0.461)*	-0.365	-0.392	(0.160)**	(0.137)**	-0.389
Cet9094						-0.717	-0.778
						(0.097)**	(0.238)**
Cet9599						-0.942	
						(0.113)**	
Constant	1.058	1.331	0.691	0.624	0.208	1.077	0.861
	(0.273)**	(0.512)**	-0.516	-0.564	-0.544	(0.272)**	-0.58
No. of observations	3,720	930	930	930	930	3,720	930
Adjusted R-squared	0.76	0.76	0.79	0.78	0.8	0.76	0.78

Note: Robust standard errors in parentheses.
* significant at 5 percent; ** significant at 1 percent

as explained earlier). Since the CET was implemented in successive phases, starting in the early 1990, we do not have a dummy variable for the 1980s. For the 1990s, (CET9094 and CET9499), a value of one is assigned if two CARICOM trading partners implemented the phase of the CET reduction considered. The results are presented in equations [4.6], [4.7], [5.6], and [5.7].

The intra-CARICOM trade variable also remains positive and significant, implying the importance of the common market. Similar results are found in the 1990–94 averages regression. For the 1995–99 period, the CET variable was dropped due to collinearity with the CARICOM variables, as all CARICOM members implemented the CET reforms.

The panels of average were then estimated using a Tobit model in Tables 6 and 7. The results from the censored regression again supports the OLS results for the averages with and without trade liberalization. The standard gravity variables for income, population, and distance had the expected signs and were significant. The main dummy variables again exhibited the expected signs. Intra-CARICOM trade was again significant and positive (though with loss of an upward bias), when controlling for other trading arrangements and interregional trade. This again shows the trade-creating features of CARICOM. CARICOM trade with other regions also increases. The linguistic dummies, particularly between English speaking countries, also explains a large part of bilateral trade. The ACP and dollar banana dummy variables show significant tradecreating features. Primary producers' dummy variable becomes positive under the Tobit specification, perhaps capturing the censored nature of the data, i.e., with censoring a large part of zero or missing observations were dropped, making the little trade between primary producers significant in the censored sample.

b. Estimations on trade for specific years

We now proceed to the point estimations. Again, the gravity model was fitted on bilateral trade for the following years (or points) 1980, 1985, 1990, 1995 and 1999. Tables 8 to 11 report the results for estimations on trade and modified trade, using OLS and then Tobit estimation methods.

The panel of points regression [5.1] supports the results from the averages regressions. The income variable was highly significant and positive in sign (though smaller in size). In the individual point regression, the size of this coefficient varies quite considerably, indicating the variance in the trade at particular points in time. While the cross-sectional points analysis over time gives an indication of the direction of trade, it does not give a good measure of the dynamics, due to this bias.

The population term is significant and negative (correctly) signed in all but the panel regression. Clearly, the points panel produces a result contradictory to the gravity model, perhaps reflective of the fact that while an estimation of the model can be made at a particular time, an aggregation of these points to get any dynamic inferences may not be

Table 6. Average Trade, Tobit

	Averages Without Trade Liberalization					Average With Trade Liberalization		
	Pooled Panel	1980–84	1985–89	1990–94	1995–99	Pooled panel	1990–94	1995–99
Dependent variable: Log Average Trade	[6.1]	[6.2]	[6.3]	[6.4]	[6.5]	[6.6]	[6.7]	[6.8]
lAvGDP	1.327	1.481	1.486	1.412	1.487	1.346	1.405	1.487
	(0.030)**	(0.064)**	(0.065)**	(0.058)**	(0.061)**	(0.030)**	(0.058)**	(0.061)**
lAvpop	-0.298	-0.588	-0.515	-0.41	-0.449	-0.331	-0.392	-0.449
	(0.042)**	(0.091)**	(0.091)**	(0.079)**	(0.081)**	(0.042)**	(0.079)**	(0.081)**
ldistance	-1.223	-1.316	-1.238	-0.976	-1.356	-1.231	-1.029	-1.356
	(0.046)**	(0.089)**	(0.092)**	(0.084)**	(0.090)**	(0.045)**	(0.087)**	(0.090)**
Intra-CARICOM	3.474	2.906	3.148	3.958	2.857	3.884	4.685	2.857
	(0.186)**	(0.362)**	(0.378)**	(0.330)**	(0.381)**	(0.203)**	(0.479)**	(0.381)**
Caother	0.252	-0.411	-0.015	-0.09	0.405	0.194	-0.052	0.405
	-0.148	-0.28	-0.301	-0.278	-0.304	-0.148	-0.278	-0.304
English	0.321	0.456	0.541	0.136	0.251	0.314	0.148	0.251
	(0.094)**	(0.195)*	(0.189)**	-0.168	-0.178	(0.094)**	-0.168	-0.178
Spanish	0.624	0.121	0.4	0.771	1.095	0.62	0.728	1.095
	(0.190)**	-0.363	-0.382	(0.342)*	(0.382)**	(0.189)**	(0.341)*	(0.382)**
Eccb	0.535	0.21	0.654	0.176	0.69	0.559	0.414	0.69
	(0.259)*	-0.486	-0.517	-0.452	-0.527	(0.258)*	-0.465	-0.527
Primary	-0.012	0.032	-0.037	0.711	-0.031	-0.018	0.623	-0.031
	-0.115	-0.223	-0.233	(0.218)**	-0.23	-0.115	(0.221)**	-0.23
WTO	-0.401	0.263	-0.057	-0.124	0.596	-0.277	-0.169	0.596
	(0.089)**	-0.19	-0.195	-0.173	(0.278)*	(0.092)**	-0.174	(0.278)*
Dollarba	0.322	0.377	0.352	0.073	0.307	0.332	0.063	0.307
	-0.178	-0.32	-0.354	-0.337	-0.354	-0.177	-0.336	-0.354
Eubanana	0.711	0.94	0.584	0.836	0.461	0.727	0.8	0.461
	(0.215)**	(0.442)*	-0.425	(0.372)*	-0.427	(0.214)**	(0.371)*	-0.427
ACP	1.847	1.652	1.944	1.58	-0.32	1.846	1.581	-0.32
	(0.181)**	(0.323)**	(0.323)**	(0.283)**	-0.836	(0.180)**	(0.282)**	-0.836
Comesa	1.273	0.231	1.393	0.801	1.806	1.242	0.795	1.806
	(0.247)**	-0.751	-0.797	-0.693	(0.330)**	(0.246)**	-0.691	(0.330)**
Cet9094						-0.634	-1.009	
						(0.266)*	(0.483)*	
Cet9599	3.426	5.133	3.249	1.199	2.497	3.463	1.641	2.497
	(0.447)**	(0.859)**	(0.909)**	-0.83	(0.896)**	(0.445)**	-0.854	(0.896)**
Constant						-1.367		
						(0.256)**		
No. of bservations	2,749	662	705	636	746	2,749	636	746

Note: Robust standard errors in parentheses.

* significant at 5 percent; ** significant at 1 percent

feasible. The distance variable is negative and significant, implying that more bilateral trade occurs between countries that are closer than those which are further away.

The intra-CARICOM trade variable is significant for all the regressions, again implying the importance of trade among CARICOM countries despite increasing interregional trade and external liberalization. Of the regional trading arrangement dummies, only the ACP dummy shows a positive and significant effect in both the panel of points and cross-section. This probably signifies the overarching importance of this trading arrangement over other treaties and links.

Table 9 reports the results for the model with the modified trade variable. The results and signs on the coefficients, particularly income, population (except the panel), distance, and intra-CARICOM trade remain correctly signed but exhibit significant decline in size. Other dummy variables also experience a reduction in upward bias.

The primary producer's dummy variable becomes positive, again indicating the inclusion of those observations with the artificial trade. In fact, for countries with very low volumes of trade, such as trade among primary producers, this may over-state trade, hence the significant result from this term.

The Tobit was also estimated with the point data. Again the income term was positive and highly significant in the panel and cross-sectional periods. The population term was again negative and significant, except for the panel. The distance term also had the expected signs.

The intra-CARICOM trade and ACP terms remained highly robust while the English-speaking term became significant. Similar results were obtained from the Modified Tobit model, with the main difference being a reduction in the size of the coefficients for the key variables, in particular, income, population, distance, intra-CARICOM trade, and interregional trade.

Table 11 reports the results from the Tobit model with the modified trade variable. As with the preceeding regression, the coefficients are in line with theoretical priors. However, as with the other "modified" models, the primary producer's dummy became significant. This again implies an overstatement of trade for those countries with low trade volumes. While the modified version reduces the upward bias in all the models, it may distort the results in this way.

VI. Conclusions and Policy Implications

- The most important result from this study is that **CARICOM has been trade-creating, even though CARICOM trade with the rest of the world, at the same time, has been increasing, fueled by trade liberalization measures** (notably the reduction of the common external tariff). Thus, total CARICOM trade has increased over the period under study. This shows that there is untapped potential for higher intratrade, implying that **further regional integration is warranted and, at the same time, trade liberalization should continue.**

- **The existence of the Eastern Caribbean Currency Union (ECCU) has not constrained trade among the larger CARICOM**. Controlling for the latter, the ECCU **is not** trade creating among its members.

- Various **changes in the EU banana regime, which have allowed greater access to the EU banana market for non-ACP producers, have negatively affected CARICOM trade**. The region should thus diversify its export base.

- Cultural proximity as captured by the use of a **common language is a strong trade-creating feature**. Presumably, common language reduces transaction costs, thereby fostering trade.

- **Economic and trading arrangements are trade-creating even controlling for globalization.** This is true for regional groups such as CARICOM and COMESA, but also for wider trading arrangements that link rich and developing countries, such as the ACP. To the extent that higher trade makes countries richer, **regional integration should be advocated**.

- **WTO membership has not yet had a positive impact on trade in the CARICOM region.** This may reflect the widespread barriers that still pervade international trade. Thus, there is a need for further global trade liberalization.

Table 7. Average Modified Trade, Tobit

	Pooled Panel	Averages Without Trade Liberalization				Average With Trade Liberalization Pooled Panel		
		1980–84	1985–89	1990–94	1995–99		1990–94	1995–99
Dependent Variable: Log Average Trade	[7.1]	[7.2]	[7.3]	[7.4]	[7.5]	[7.6]	[7.7]	[7.8]
lAvGDP	1.061	1.127	1.148	1.301	1.142	1.077	1.29	1.142
	(0.020)**	(0.042)**	(0.038)**	(0.045)**	(0.039)**	(0.020)**	(0.045)**	(0.039)**
lAvpop	-0.29	-0.512	-0.47	-0.47	-0.369	-0.318	-0.447	-0.369
	(0.028)**	(0.060)**	(0.054)**	(0.062)**	(0.051)**	(0.028)**	(0.062)**	(0.051)**
ldistance	-0.714	-0.627	-0.6	-0.853	-0.71	-0.72	-0.907	-0.71
	(0.031)**	(0.059)**	(0.054)**	(0.065)**	(0.057)**	(0.030)**	(0.067)**	(0.057)**
Intra-caricom	2.307	1.991	1.902	2.571	1.877	2.778	3.55	1.877
	(0.129)**	(0.244)**	(0.229)**	(0.272)**	(0.246)**	(0.141)**	(0.397)**	(0.246)**
Caother	0.454	-0.004	0.21	0.333	0.374	0.404	0.367	0.374
	(0.098)**	-0.184	-0.176	-0.211	(0.188)*	(0.097)**	-0.21	(0.188)*
English	0.735	0.739	0.849	0.806	0.654	0.735	0.815	0.654
	(0.062)**	(0.125)**	(0.111)**	(0.130)**	(0.112)**	(0.062)**	(0.130)**	(0.112)**
Spanish	0.636	0.443	0.345	0.805	0.888	0.623	0.741	0.888
	(0.133)**	-0.251	-0.234	(0.278)**	(0.248)**	(0.132)**	(0.277)**	(0.248)**
ECCB	0.27	0.402	0.298	-0.151	0.21	0.317	0.17	0.21
	-0.185	-0.344	-0.322	-0.381	-0.346	-0.183	-0.39	-0.346
Primary	0.593	0.581	0.666	0.961	0.805	0.588	0.886	0.805
	(0.073)**	(0.138)**	(0.128)**	(0.159)**	(0.141)**	(0.072)**	(0.160)**	(0.141)**
WTO	-0.212	0.407	0.093	0.008	0.288	-0.122	-0.036	0.288
	(0.059)**	(0.122)**	-0.113	-0.133	-0.166	(0.060)*	-0.133	-0.166
Dollarba	0.39	0.719	0.404	-0.02	0.393	0.395	-0.034	0.393
	(0.117)**	(0.215)**	-0.207	-0.256	-0.217	(0.116)**	-0.254	-0.217
Eubanana	-0.25	-0.721	-0.301	-0.035	-0.126	-0.245	-0.068	-0.126
	-0.149	(0.280)*	-0.264	-0.311	-0.281	-0.148	-0.31	-0.281
Acp	1.38	1.153	1.163	1.333	1.462	1.373	1.327	1.462
	(0.129)**	(0.228)**	(0.202)**	(0.238)**	(0.552)**	(0.128)**	(0.237)**	(0.552)**
Comesa	0.683	-0.27	0.176	0.107	1.186	0.654	0.064	1.186
	(0.177)**	-0.529	-0.495	-0.581	(0.217)**	(0.175)**	-0.578	(0.217)**
Cet9094						-0.972	-1.365	
						(0.190)**	(0.403)**	
Cet9599	1.443	1.786	0.778	1.22	0.351	1.482	1.698	0.351
	(0.302)**	(0.576)**	-0.543	-0.653	-0.569	(0.300)**	(0.664)*	-0.569
Constant						-1.373		
						(0.181)**		
No.of observations	3,720	930	930	930	930	3,720	930	930

Note: Robust standard errors in parentheses.

* significant at 5 percent; ** significant at 1 percent.

Table 8. Point Trade, OLS

Dependent Variable:	Pooled Panel	1980	1985	1990	1995	1999
Log Point Trade	[8.1]	[8.2]	[8.3]	[8.4]	[8.5]	[8.6]
LPGDP	0.626	10.78	1.463	1.434	1.58	1.545
	(0.028)**	(2.387)**	(0.059)**	(0.057)**	(0.059)**	(0.055)**
LPpop	0.442	-9.674	-0.672	-0.5	-0.674	-0.634
	(0.043)**	(2.388)**	(0.091)**	(0.083)**	(0.088)**	(0.079)**
Ldistance	-1.226	-1.226	-1.271	-1.033	-1.204	-1.132
	(0.058)**	(0.134)**	(0.121)**	(0.123)**	(0.110)**	(0.101)**
Intra-CARICOM	3.404	2.794	1.363	2.983	2.45	2.478
	(0.237)**	(0.576)**	(0.489)**	(0.517)**	(0.471)**	(0.441)**
Caother	0.859	0.892	-0.412	0.056	-0.358	-0.003
	(0.174)**	(0.408)*	-0.307	-0.303	-0.309	-0.298
English	-0.097	-0.16	0.332	0.529	0.389	-0.008
	-0.113	-0.315	-0.192	(0.187)**	(0.177)*	-0.179
Spanish	0.458	0.942	-0.208	0.325	1.026	0.948
	(0.216)*	-0.55	-0.435	-0.533	(0.360)**	(0.380)*
ECCB	1.022	-0.013	0.368	0.694	1.167	0.105
	(0.225)**	-0.654	-0.523	-0.42	(0.502)*	-0.525
Primary	-0.725	-0.797	0.417	0.25	0.029	0.426
	(0.157)**	(0.371)*	-0.363	-0.377	-0.308	-0.314
WTO	-0.457	-0.035	0.507	-0.1	0.713	0.493
	(0.108)**	-0.281	(0.191)**	-0.205	(0.314)*	-0.277
Dollarba	0.645	1.313	0.511	0.236	-0.183	0.294
	(0.163)**	(0.308)**	-0.284	-0.228	-0.285	-0.276
Eubanana	1.09	0.357	0.403	0.58	0.542	0.336
	(0.166)**	-0.555	-0.223	(0.229)*	(0.187)**	-0.235
ACP	1.454	1.212	1.473	1.422	1.7	1.372
	(0.126)**	(0.300)**	(0.170)**	(0.160)**	(0.152)**	(0.166)**
Comesa	0.065	-1.226	-0.421	1.954	2.029	1.519
	-0.329	(0.515)*	-0.689	(0.541)**	(0.543)**	(0.690)*
Constant	5.499	7.602	4.982	1.651	1.588	1.195
	(0.547)**	(1.273)**	(1.099)**	-1.194	-0.985	-0.978
No. of observations	3,112	524	566	641	715	666
Adjusted R-squared	0.63	0.59	0.76	0.74	0.76	0.77

Note: Robust standard errors in parentheses.

* significant at 5 percent; ** significant at 1 percent.

Table 9. Point Modified Trade, OLS

Dependent Variable: Log Point Trade	Pooled Panel [9.1]	1980 [9.2]	1985 [9.3]	1990 [9.4]	1995 [9.5]	1999 [9.6]
LPGDP	0.506	8.497	0.968	1.05	1.086	1.143
	(0.019)**	(1.070)**	(0.038)**	(0.035)**	(0.035)**	(0.036)**
LPpop	0.195	-7.8	-0.459	-0.464	-0.478	-0.501
	(0.027)**	(1.067)**	(0.050)**	(0.046)**	(0.045)**	(0.047)**
Ldistance	-0.632	-0.641	-0.422	-0.47	-0.48	-0.5
	(0.034)**	(0.079)**	(0.057)**	(0.052)**	(0.055)**	(0.063)**
Intra-CARICOM	1.78	1.92	0.917	1.141	0.934	1.13
	(0.112)**	(0.255)**	(0.191)**	(0.183)**	(0.213)**	(0.234)**
Caother	0.784	0.783	-0.172	0.008	0.064	0.082
	(0.086)**	(0.197)**	-0.152	-0.144	-0.142	-0.174
English	0.432	0.019	0.91	0.902	0.892	0.848
	(0.058)**	-0.144	(0.108)**	(0.094)**	(0.091)**	(0.100)**
Spanish	0.276	0.711	-0.005	0.178	0.526	0.611
	(0.135)*	(0.341)*	-0.284	-0.258	(0.229)*	(0.294)*
ECCB	0.218	-0.358	0.141	-0.03	0.266	-0.026
	(0.101)*	-0.286	-0.157	-0.147	-0.2	-0.211
Primary	0.258	0.168	0.832	0.863	0.96	0.983
	(0.055)**	-0.115	(0.108)**	(0.109)**	(0.120)**	(0.136)**
WTO	-0.354	0.251	0.104	-0.021	-0.173	-0.097
	(0.053)**	-0.151	-0.105	-0.095	-0.134	-0.144
Dollarba	0.531	1.012	0.567	0.18	0.263	0.606
	(0.091)**	(0.226)**	(0.151)**	-0.141	(0.128)*	(0.159)**
Eubanana	-0.172	-0.764	-1.111	-0.318	-0.403	-0.451
	-0.108	(0.278)**	(0.261)**	(0.148)*	(0.141)**	(0.193)*
Acp	1.057	1.097	1.095	0.845	0.929	0.834
	(0.087)**	(0.217)**	(0.169)**	(0.151)**	(0.146)**	(0.166)**
Comesa	-0.997	-1.677	-1.213	-0.068	0.017	0.024
	(0.222)**	(0.274)**	(0.406)**	-0.407	-0.399	-0.472
Constant	3.012	4.587	0.967	0.461	0.03	-0.423
	(0.319)**	(0.740)**	-0.538	-0.507	-0.523	-0.602
No. of observations	4,650	930	930	930	930	930
Adjusted R-squared	0.65	0.57	0.75	0.79	0.81	0.78

Note: Robust standard errors in parentheses.
* significant at 5 percent; ** significant at 1 percent.

Table 10. Point Trade, Tobit

Dependent Variable:	Pooled Panel	1980	1985	1990	1995	1999
Log Point Trade	[10.1]	[10.2]	[10.3]	[10.4]	[10.5]	[10.6]
LPGDP	0.626	10.794	1.463	1.434	1.58	1.545
	(0.027)**	(2.374)**	(0.068)**	(0.068)**	(0.067)**	(0.063)**
LPpop	0.442	-9.688	-0.672	-0.5	-0.673	-0.633
	(0.040)**	(2.376)**	(0.095)**	(0.096)**	(0.090)**	(0.085)**
Ldistance	-1.227	-1.227	-1.274	-1.034	-1.205	-1.133
	(0.055)**	(0.134)**	(0.100)**	(0.097)**	(0.096)**	(0.095)**
Intra-CARICOM	3.402	2.782	1.354	2.979	2.447	2.483
	(0.218)**	(0.528)**	(0.401)**	(0.396)**	(0.402)**	(0.393)**
Caother	0.859	0.892	-0.409	0.056	-0.357	-0.003
	(0.171)**	(0.406)*	-0.302	-0.318	-0.323	-0.313
English	-0.097	-0.161	0.332	0.53	0.389	-0.01
	-0.11	-0.293	-0.213	(0.198)**	(0.192)*	-0.184
Spanish	0.458	0.944	-0.209	0.324	1.026	0.946
	(0.220)*	-0.518	-0.39	-0.391	(0.399)*	(0.391)*
ECCB	1.025	0.001	0.379	0.697	1.172	0.104
	(0.290)**	-0.663	-0.499	-0.526	(0.549)*	-0.519
Primary	-0.727	-0.805	0.41	0.248	0.027	0.428
	(0.139)**	(0.339)*	-0.267	-0.259	-0.251	-0.249
WTO	-0.458	-0.033	0.508	-0.102	0.713	0.491
	(0.105)**	-0.287	(0.203)*	-0.203	(0.290)*	-0.284
Dollarba	0.645	1.314	0.511	0.236	-0.183	0.294
	(0.200)**	(0.455)**	-0.351	-0.394	-0.363	-0.344
Eubanana	1.089	0.355	0.402	0.579	0.542	0.338
	(0.249)**	-0.704	-0.464	-0.426	-0.442	-0.416
ACP	1.454	1.211	1.473	1.422	1.7	1.373
	(0.182)**	(0.440)**	(0.316)**	(0.322)**	(0.339)**	(0.319)**
Comesa	0.065	-1.22	-0.42	1.955	2.029	1.519
	-0.492	-1.731	-0.882	(0.852)*	(0.831)*	-0.785
Constant	5.503	7.611	5.003	1.658	1.593	1.198
	(0.528)**	(1.277)**	(0.970)**	-0.966	-0.946	-0.949
No. of observations	3,112	524	566	641	715	666

Note: Robust standard errors in parentheses.
* significant at 5 percent; ** significant at 1 percent.

Table 11. Point Modified Trade, Tobit

Dependent Variable:	Pooled Panel	1980	1985	1990	1995	1999
Log Point Trade	[11.1]	[11.2]	[11.3]	[11.4]	[11.5]	[11.6]
LPGDP	0.638	14.823	1.226	1.275	1.237	1.304
	(0.019)**	(1.689)**	(0.047)**	(0.040)**	(0.037)**	(0.044)**
Lppop	0.245	-13.804	-0.549	-0.579	-0.555	-0.564
	(0.028)**	(1.691)**	(0.065)**	(0.058)**	(0.051)**	(0.060)**
Ldistance	-0.938	-1.123	-0.746	-0.728	-0.68	-0.724
	(0.037)**	(0.100)**	(0.067)**	(0.058)**	(0.054)**	(0.066)**
Intra-CARICOM	3.207	4.499	2.441	2.006	1.423	1.902
	(0.155)**	(0.414)**	(0.278)**	(0.246)**	(0.231)**	(0.283)**
Caother	0.95	0.963	-0.21	0.023	0.064	0.048
	(0.115)**	(0.305)**	-0.208	-0.19	-0.179	-0.219
English	0.331	-0.402	0.703	0.8	0.856	0.789
	(0.074)**	-0.209	(0.142)**	(0.119)**	(0.107)**	(0.130)**
Spanish	0.722	1.604	0.334	0.49	0.709	0.869
	(0.158)**	(0.416)**	-0.277	(0.245)*	(0.231)**	(0.282)**
ECCB	0.679	0.02	0.556	0.244	0.329	0.132
	(0.217)**	-0.566	-0.375	-0.337	-0.32	-0.39
Primary	-0.279	-0.492	0.534	0.529	0.714	0.633
	(0.088)**	(0.239)*	(0.164)**	(0.142)**	(0.134)**	(0.165)**
WTO	-0.068	0.775	0.416	0.155	0.266	0.46
	-0.07	(0.209)**	(0.134)**	-0.12	-0.157	(0.192)*
Dollarba	0.614	1.607	0.583	-0.093	0.137	0.589
	(0.138)**	(0.357)**	(0.248)*	-0.23	-0.204	(0.245)*
Eubanana	0.147	-0.579	-0.685	-0.062	-0.337	-0.266
	-0.178	-0.5	(0.315)*	-0.275	-0.259	-0.314
ACP	1.288	1.409	1.383	1.005	1.044	1.003
	(0.137)**	(0.374)**	(0.235)**	(0.209)**	(0.200)**	(0.242)**
Comesa	-0.283	-0.284	-0.5	0.686	0.567	0.752
	-0.357	-1.505	-0.597	-0.521	-0.487	-0.591
Constant	3.741	6.622	1.721	1.1	0.299	-0.343
	(0.363)**	(0.968)**	(0.661)**	-0.582	-0.537	-0.668
No. of observations	4,650	930	930	930	930	930

Note: Standard errors in parentheses.
* significant at 5 percent, ** significant at 1 percent.

Description Of Variables

1. The variables

Basic gravity model variables

lAvGDP Log of average product of income between trading partners, proxied by PPP-corrected GDP.

lAvpop Log of average product of population between trading partners.

ldistance Log of distance—distance is measured as distance between two capital cities.

CARICOM variables

CARICOM Dummy variable denoting intra-CARICOM trade, with a value of 1 if both trading countries are members of the CARICOM and zero otherwise.

Caother Dummy variable denoting trade between CARICOM members and non-CARICOM members. This variable takes a value of 1 if a CARICOM member trades with a nonmember and zero otherwise.

Language and cultural variables

English Dummy variable taking value of 1 if both trading partners are English-speaking countries and zero otherwise.

Spanish Dummy variable taking value of one if both trading partners are Spanish-speaking countries and zero otherwise.

Currency union variable

ECCU Dummy variable taking value of one if both trading partners are members of the ECCU and zero otherwise.

Primary producers variable

Primary Dummy variable taking value of one if both trading partners are primary producers and zero otherwise.

Nonprimary Dummy variable taking value of one if both trading partners are nonprimary producers and zero otherwise.

Trade liberalization variable

WTO Dummy variable taking value of one if both trading partners are WTO members and zero otherwise.

Cet9094 Stands for implementation of CET reform in the CARICOM. The dummy variable takes a value of one if both CARICOM trading partners implemented the first phase of the CET reduction (from 45 to 35 percent) during 1993–94.

Cet9599 Stands for implementation of CET reform in the CARICOM. The dummy variable takes a value of one if both CARICOM trading partners implemented the second phase (from 35 to 30 percent) and/or the third phase (from 30 to 25 percent) and/or the fourth phase (from 25 to 20 percent) of the CET reduction during 1994–95.

Banana variables (Information based on Davico, 2002)

Dollarba Dummy variable taking value of one if exporters are dollar banana producers and zero otherwise.

Eubanana Dummy variable taking value of one if banana exporters receive preferential EU access and zero otherwise.

UKbanana Dummy variable taking value of one if banana exporters receive preferential access to the United Kingdom and zero otherwise.

Nonukeuba Dummy variable taking value of one if banana exporters receive preferential access to the non-U.K. EU and zero otherwise.

[Change in banana regime dummy (effect in parentheses)

(+) July 1993—Limitation of dollar banana imports into the EU to 2 million tons takes effect

(-) April 1994—Increase in dollar banana import into EU increased to 2.2 million tons

(-) January 1995—Increase in dollar banana import into EU increased to 2.6 million tons

(-) January 1999—Amended EU banana regime comes into effect]

Economic and trading groups

ACP Dummy variable taking value of one if both trading partners are ACP members and zero otherwise.

Comesa Dummy variable taking value of one if both trading partners are COMESA members and zero otherwise.

Regions by economic development

Casouth This dummy captures CARICOM trade with the "South"; Dummy that takes a value of one when the reporting country or the partner country is a CARICOM member and the partner or reporting country is a developing country.

CanonEUN This dummy captures CARICOM trade with the "North." Dummy that takes a value of one when the reporting country or the partner country is a CARICOM member and the partner or reporting country is a non-Lomé (or non-EU) industrial country.

CanoncaS This dummy captures CARICOM trade with the non-CARICOM South. Dummy that takes a value of one when the reporting country or the partner country is a CARICOM member and the partner or reporting country is a non-CARICOM developing country

NoncaSN This dummy captures trade between the non-CARICOM South and the North. Dummy that takes a value of one when the reporting country or the partner country is a non-CARICOM developing country and the partner or reporting country is an industrial country.

Dummy variables weighted geographical fixed effect

WCARICOM Dummy variable capturing CARICOM trade (weighted by its relative size) with the rest of world.

Africa Dummy variable capturing African countries' trade (weighted by its relative size) with the rest of world.

Asia Dummy variable capturing Asian countries' trade (weighted by its relative size) with the rest of world.

EU Dummy variable capturing EU countries' trade (weighted by its relative size) with the rest of world.

Na Dummy variable capturing North American countries' trade (weighted by its relative size) with the rest of world.

Latam Dummy variable capturing Latin American countries' trade (weighted by its relative size) with the rest of world.

2. Data

The bulk of the data comes from the IMF's *Direction Of Trade Statistics* and covers merchandise trade. Data for intra-CARICOM trade were obtained from the CARICOM Secretariat and were useful in filling some blanks in the DOT data for CARICOM.

Our study uses import (c.i.f.) trade data. The reasons are the following: (i) they capture costs associated with freight, taxation, and insurance, which, to the extent that they increase the costs of trading, are a determinant of the amount of trade; (ii) most trade studies based on the gravity model find little difference whether total trade is used or one of its components; and (iii) conceptually, total bilateral trade (E+M) double-counts trade flows on a global basis.

Countries Covered by the Sample

Africa
Kenya
Malawi
Tanzania
Zimbabwe

Asia
Bangladesh
Japan
Korea
Nepal
Sri Lanka

CARICOM
Barbados
Belize
Dominica
Grenada
Guyana
Jamaica
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenadines
Trinidad and Tobago

Europe
EU (composed of Austria, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and Switzerland)
United Kingdom.

Latin America
Brazil
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama
Venezuela

North America
United States
Canada

A. Theoretical Derivation of the Gravity Model

Anderson (1979) derives a gravity equation from the properties of expenditure systems. The model uses a structure where traded-goods preference is very similar, and where trade tax structures and transport costs are also similar. It specifies that the share of national expenditure accounted for by spending on tradable (openness to trade) is a stable unidentified reduced form function of income and population.

Consider the case where there are many classes of goods flowing between country *i* and *j*, with a full set of national tariffs and transport costs (proxied by distance). As mentioned, preferences for traded goods are identical across countries and are homothetic. Within each commodity class, goods are considered to be differentiated by place of origin. The landed value at country *j* of commodity class *k* goods produced in country *i* is

$$M_{ijk}\tau_{ijk}. \tag{1}$$

Demand for imports *ik* (with foreign port prices of unity is)

$$M_{ijk} = \frac{1}{\tau_{ijk}}\theta_{ik}(\tau_j)\phi_j Y. \tag{2}$$

Aggregate trade flows between *i* and *j* are

$$M_{ij} = \sum M_{ijk} = \theta_j Y_j \sum_k \frac{1}{\tau_{ijk}}\theta_{ik}(\tau_j). \tag{3}$$

The trade balance relation is

$$m_i\theta_i Y_i = \sum_j M_{ij} = \sum_j \theta_j Y_j \sum_k \frac{1}{\tau_{ijk}}\theta_{ik}(\tau_j). \tag{4}$$

Substituting the left hand side of equation (4) into equation (3), we get the gravity equation

$$M_{ij} = \frac{m_i\phi_i Y_i \phi_j Y_j}{\sum_j \phi_j Y_j}. \tag{5}$$

According to Anderson (1979), with many goods, only the aggregate version of the equation is valid under the present interpretation. With τ_{ijk} departing from unity, the division of both sides of equation (4) by $\Sigma_j\theta_j Y_j$ produces

$$\frac{m_i\phi_i Y_i}{\sum_j \phi_j Y_j} = \sum_j \frac{\phi_j Y_j}{\sum_j \phi_j Y_j}\sum_k \frac{1}{\tau_{ijk}}\theta_{ik}(\tau_j). \tag{6}$$

The gravity equation substitutes for the share in (3), $\sum_k (1/\tau_{ijk})\theta_{ik}(\tau_j)$, a weighted average of such shares across all countries j. This will cause bias of unknown sign in the gravity equation parameter estimator based on the stochastic version of equation (4), and the demand equation (2). Other things being equal, the bias will be less, the more closely the transit costs resemble one another. This means that similarity of transit costs should be a criterion for selecting countries in the sample, a condition that Anderson argues too be to restricting. Anderson nevertheless argues that even with this dissimilarity, the bias may be small.

If transit costs are an increasing function of distance and the same across commodities, ($\tau_{ijk} = f(d_{ij})$ with $f(0) = 1$ and $f' > 0$), then with Cobb Douglas preferences the demand equation and trade balance equations become

$$M_{ij} = (\sum_k \theta_{ik})\phi_j Y_j \frac{1}{f(d_{ij})} U_{ij} . \tag{7}$$

$$m_i \phi_i Y_i = (\sum_k \phi_{ik}) \sum_j \phi_j Y_j \frac{1}{f(d_{ij})} . \tag{8}$$

Equation (7) states the foreign price value of country j's demand for all of is goods equals country j's total expenditure on traded goods (in home prices), $\theta_j Y_j$ times the common aggregate traded goods expenditure share for i's goods $\sum_k \theta_{ik}$ deflated by the transport cost factor. Equation (8) states that country i's expenditure on all traded goods at i's prices $\theta_i Y_i$ times the capital account scale factor m_i must equal the value at country i of i's exports to all countries. Anderson then derives the gravity equation as

$$M_{ij} = \frac{m_i \phi_i Y_i \phi_j Y_j}{\sum_j \phi_j Y_j} \cdot \frac{1}{f(d_{ij})} \cdot [\sum_j \frac{\phi_j Y_j}{\sum_j \phi_j Y_j} \cdot \frac{1}{f(d_{ij})}]^{-1} U_{ij} . \tag{9}$$

This is an aggregate equation, where m and θ are the log linear functions of income and population. The items in the square bracket can be interpreted to mean that the flow from i to j depends on economic distance between i and j relative to the trade-weighted average of economic distance from i to all points in the system. The square bracket term might have little variation across origin points i for a group of countries in close geographic distribution. Changing the origin point will lengthen some distances and shorten others. If the bias is small, the estimates of θ's can be estimated from

$$M_{ijk} = [(\hat{\frac{1}{f(d_{ij})}})(\theta_j Y_j)]\hat{\theta}_{ik} U_{ijk} . \tag{10}$$

If the bias from omitting the bracketed term is larger, then equation (9) can be estimated with constant weights in the bracket term equal to observed trade total expenditure shares according to Anderson (1979). Since nonlinear estimation will have to be used, there will be some loss in efficiency. The preferred procedure depends on the trade-off between the efficiency and bias.[4]

[4] It is possible to use less restrictive assumptions than identical transport costs or even Cobb-Douglas assumptions. For example, with CES preferences where trade taxes are the same across countries *j* for any good *k* of country *i*, and if transport cost depend only on distance, a gravity equation may still provide efficiency gains that may dominate the bias, Anderson (1979).

BIBLIOGRAPHY

Anderson, J.E., 1979, "A Theoretical Foundation of the Gravity Model," *American Economic Review*, Vol. 69, No.1, pp.106-116.

Al-Atrash H. M., and T. Yousef, 2000, "Intra-Arab Trade: Is It Too Little? " IMF Working Paper No. 00/10 (Washington: International Monetary Fund).

Bergstrand, J.H., 1985, "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *Review of Economics and Statistics*, Vol. 67 (August) pp. 44-81.

Bayoumi, T., 1999, "Estimating Trade Equations from Aggregate Bilateral Data, IMF Working Paper No. 99/04 (Washington: International Monetary Fund).

——, and B. Eichengreen, 1995, "Is Regionalism Simply a Diversion? Evidence from the Evolution of the EC and EFTA," IMF Working Paper No. 95/109 (Washington: International Monetary Fund).

Coe, D., and A. Hoffmaister, 1999, "North-South Trade: Is Africa Unusual?" *Journal of African Economies*, Vol. 8, No. 2, pp. 228-256.

Davico, R., 2002, "The Restructuring of the Banana Industry in St.Lucia and the Windward Islands," *International Monetary Fund Selected Issues Paper,* No. 02/14.

Deardorff, A., 1995, "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" NBER Working Paper No. 5377 (Cambridge Massachusetts: National Bureau of Economic Research).

Fitzpatrick, G.L., and M.J. Modlin, 1996, "*Direct-Line Distances International Edition,* New Jersey: The Scarecrow Press Inc.

Frankel, J.A., 1997, *Regional Trading Blocs in the World Economic System* (Washington: Institute for International Economics).

——, J. A., and A.K. Rose, 2000, "Estimating the Effect of Currency Unions on Trade and Output," NBER Working Paper No. 7857 (Cambridge Massachusetts: National Bureau of Economic Research)

Foroutan, F., and L. Pritchett, 1993, "Intra-Sub-Saharan African Trade: Is it Too Little?" World Bank Policy Research Working Paper No. 1225.

Subramanian, A., and N. Tamirisa, 2001, "Africa's Trade Revisited," IMF Working Paper No. 01/33 (Washington: International Monetary Fund).

Helpman, E., 1984, "Increasing Returns, Imperfect Markets and Trade Theory," in *Handbook of International Trade*, Vol. 1, ed. By R.W. Joneas and P.B. Kenen (Amsterdam: North-Holland).

Krugman, P., 1985, "The Narrow and Broad Arguments for Free Trade," *American Economic Review, Papers and Proceedings*, Vol. 83, No. 2, pp. 362-362.

Rose, A., 2002, "The Effect of Common Currencies on International Trade" (unpublished; Berkeley, California: University of California).