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Contribution of Agriculture and Agri-Food Sectors to the Economy of Trinidad and Tobago

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Abstract

Trinidad and Tobago is a small country in the Caribbean. Between 1996 and 2005, the economy of Trinidad and Tobago grew at an average annual rate of 8.14%. Agriculture's contribution to GDP at current prices fell from 1.4% in 2002 to 0.6% in 2006. Over this period also the average annual growth rate of the agricultural sector in real terms was -0.09 %. All Caribbean countries have seen the relative decline of agriculture as other sectors, particularly tourism and banking and finance have risen in relative importance in the economies. The main propositions of this paper are: that in Trinidad and Tobago, the "agri-food" sector has shown greater growth and contribution to the economy than agriculture; and that the growth of the agri-food sector has been accompanied by the declining importance of the "agriculture" component.

The results showed that for every 10% drop in the percentage contribution of agriculture to agribusiness, there was an approximate 1% increase in the level of agricultural exports from the USA to Trinidad and Tobago. The study showed that in Trinidad and Tobago, the "agri-food" sector has shown greater growth and contribution to the economy than agriculture. Whereas the agri-food sector has grown over the last 20 years at a rate of growth per annum of 9.2%, and still makes about a 5% contribution to GDP, agriculture grew at an annual rate of 5.5% and now makes less than a 1% contribution to GDP. Also, whereas over the data period agriculture was making a declining contribution to the agri-food sector, the "Restaurants" sub-sector was making a rapidly increasing contribution to the agri-food sector.

Keywords: agriculture, agribusiness, agri-food sector, Trinidad and Tobago

Introduction

Trinidad and Tobago is a small country in the Caribbean. It is a prominent member of CARICOM, the Caribbean Economic Community, a regional grouping of mainly English speaking countries in the Caribbean. It has a per capita GDP of around $12,182 ($US), life expectancy is about 70 years and it lies around number 57 on the Human Development Index (HDI). By comparison Barbados, also in the Caribbean, lies at number 32 on the HDI, with Cuba ranked at 50 and the Bahamas 52. (UNDP, 2006)

Between 1996 and 2005, the economy of Trinidad and Tobago grew at an average annual rate of 8.14%[1]. This high rate of growth was due to the rising output of the petroleum sector (oil and natural gas). In fact, the contribution of the petroleum sector to the economy[2] increased from 26.2% in 2002 to 45.1% in 2006. (CSO, 2006)

Agriculture's contribution to GDP at current prices fell from 1.4% in 2002 to 0.6% in 2006. Over this period also the average annual growth rate of the agricultural sector[3] was -0.09 %, meaning that the growth of the agricultural sector was not even keeping pace with the inflation rate. The sugar industry has been the single dominant industry in agriculture

in recent years, but its contribution to the primary agriculture's output has been declining. Currently this industry provides about 30% of agricultural output. Domestic agriculture now makes a more substantial contribution to GDP than the sugar industry, while non-sugar export agriculture now contributes only 3% of agricultural output.

The percentage contribution of agriculture to GDP for Trinidad and Tobago is among the lowest for the member states of CARICOM. However all these countries have seen the relative decline of agriculture as other sectors, particularly tourism and banking and finance have risen in relative importance in the economies. Thus the experience of Trinidad and Tobago is perhaps reflective of the rest of the Caribbean, especially the CARICOM states.

There has been continuing concern in CARICOM about the declining importance of agriculture among member states and many strategies and programmes have been developed aimed at bringing about the transformation and revitalization of regional agriculture.[4] This concern exists in Trinidad and Tobago, especially in the context of whether a relatively declining sector is still relevant to economic development

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[1] Mean annual percentage growth rate of real GDP.
[2] Contribution to GDP at current prices
[3] In real terms.

[4] For example the "Regional Transformation Programme" for Agriculture in CARICOM (the RTP) and the "Jagdeo Initiative" led by the current President of Guyana, a leading agricultural member state.

strategies and policies of this nation. If agriculture is deemed to be insignificant, this will cause a reduction in its status and a consequent diminution of its state funding, especially for farm programmes. Recently therefore, there have been attempts to demonstrate the wider importance of agriculture in the economy, not only for its primary production, but also in its provision of food. The common representation of this wider food and agriculture is the term "agriculture and food sector" which we will term "agri-food sector" or sometimes the "agribusiness sector".

The main propositions of this paper are:

(1) That in Trinidad and Tobago, the "agri-food" sector has shown greater growth and contribution to the economy than agriculture.
(2) That the growth of the agrifood sector has been accompanied by the declining importance of the "agriculture" component.

It is also proposed that the declining importance of agriculture in the agri-food sector in Trinidad and Tobago, has caused higher levels of importation of food from the USA into Trinidad and Tobago.

Theoretical Framework

The basis of the propositions above is the contention that, the percentage contribution of agriculture to the agri-food sector in Trinidad and Tobago has declined because of the more rapid growth of population demand for convenience foods, especially the products of fast food restaurants, as opposed to primary agricultural products. Thus the "restaurant" and "food, drink and tobacco" sub-sectors should have been making increasing percentage contributions to the agri-food sector. However it is also contended that agriculture (that is domestic farm production) has been unable to meet the increasing demands for inputs into the "restaurants" and "food, drink and tobacco" sub-sectors, because of the pull of domestic resources to the service and petroleum sectors. Thus the increasing demands for inputs for the agri-food sector have been met by agricultural imports, especially imports from the United States.

In accordance with Engel's Law, as consumers incomes increase, consumers spend a declining proportion of their income on food. This is suggested because of the lower income elasticity of food compared to other consumer goods. Thus as national income increases there is a relative decline of the agricultural sector's contribution to GDP.

Also in keeping with Bennett's law as incomes rise there is a shift in the nature of food composition with a diversification of food demand away

from starchy root crops and tubers and other products of primary agriculture, towards meats, dairy products and other processed foods.[5]

In the absence of local food expansion to meet the changing demand of consumers in the agri-food sector, especially the restaurant sub sector, the shortfall in demand would have to be met by imports. Since the traditional source of imports into Trinidad and Tobago has been the USA, one would therefore expect an increase of food exports from the USA to Trinidad and Tobago to meet the expanding demand of the agrifood sector. This is the basis of the third proposition.

Approach of the Study

In this study, utilize the national income accounts of Trinidad and Tobago since they are readily available and are known to be compiled accurately and objectively in CARICOM states. These accounts also provide the value added for each sub-sector and thus avoid the problem of double counting. In these national income accounts in Trinidad and Tobago, agriculture is well defined and accounted for. However the other elements of the "agri-food" sector are incorporated into other items in the national income accounts. However fairly disaggregated national accounts

at market (current) prices were available and these accounts allowed the formulation of a composite "agri-food" sector.

The study was carried out, by first providing definitions of the agriculture and the "agri-food" sector, from the national income accounts of Trinidad and Tobago. Then using these accounts, the study traced the time trends in these outputs from 1966, from when national accounts data were available, and their percentage contributions to GDP. The percentage contributions of the sub-sectors "agriculture", "restaurants", "wood and related products" and "food , drink and tobacco" to the "agri-food" sector were also traced.

Trends in the trade of the United States to Trinidad and Tobago were then traced for total imports, total exports as well as exports of agricultural products. Regression analysis was then carried out to determine the relationship between the percentage contribution of agriculture to the "agri-food sector" and the value of exports of agricultural products from the United States to Trinidad and Tobago to test the third proposition.

Definitions

The major definitions used in this paper are derived from the national accounts as follows[6]

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[5] Bennett's Law is discussed by Lippman 2005 p79 and Norton and Alwang 1993 p 41. Fuglie (2004) provides a recent challenge to this "law".

[6] in current $Trinidad and Tobago

(i) AGRI = "export agriculture"+ "domestic agriculture" + "sugar industry" (based on the growing of sugar cane)
In the national accounts of Trinidad and Tobago, AGRI is defined as "agriculture".

(ii) Agri food AGRIF is defined as AGRIF = AGRI + "Food, drink and tobacco" + "Wood and related products" + "Restaurants".

(iii) CAGRIAG = AGRI/AGRIF is the proportion of the agri-food sector contributed by agriculture AGRI.

(iv) CAGRIRES, CAGRIWRP, CAGRIFDT are defined similarly to CAGRIAG for the "Restaurants", "Wood and related products" and "Food drink and tobacco" sub-sectors of AGRIF.

(v) AGRICGDP = AGRI/GDP is the proportion of Agriculture in the total GDP. AGRIFCGDP is similarly defined for the "agri-food" sector.

(vi) AGRIX is used to represent the exports of agricultural products from the United States to Trinidad and Tobago. This category of "agricultural products" is defined by the Foreign Agricultural Service (FAS) (USDA) of "Agricultural Products" (in current $US) and it corresponds closely to AGRIF, excluding the item "restaurants".

(vii) TEXPORT is the total exports from USA to Trinidad and Tobago as given in the Foreign Trade Statistics of the US Census Bureau (2007). IMPORT is

similarly defined for total imports from the USA to Trinidad and Tobago.

Results

Trends of the Outputs of Agriculture and Agri-food Sector

The trends in AGRI and AGRIF were examined using SPSS Version 10[7]

AGRI

The results for AGRI are given in Chart 1. Here it is seen that agriculture grew at a strongly linear rate over the period with the linear equation producing a very good fit.

An exponential time trend for AGRI showed that agriculture in Trinidad and Tobago grew at annual percentage rate of 5.5% per year over the period 1996 to 2006.

AGRIF

The results for AGRIF are given in Chart 2. Here it is seen that the agri-food sector grew at a strongly exponential rate over the period with the exponential equation, with the exponential function providing an excellent fit.

Thus while the agriculture grew at 5.5% over the period, the agri-food

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[7] Obtained from the table of Gross Domestic Product by kind of activity –Trinidad and Tobago (current prices) for the period 1966 to 2006 (CSO, 2006) ($million TT).

sector, AGRIF, was showing a stronger constant proportional growth rate per annum of 9.2% over the period. This is a fast rate of growth, but it must be borne in mind that this is the growth measured in current prices. The average annual percentage inflation rate of Trinidad and Tobago over the period 1991 – 2006 was 4.87%[8] leaving a net growth rate of AGRIF of approximately 4% per annum.

Contribution of Agriculture and Agri-food sector to Gross Domestic Product

As seen in Chart 3, the percentage contribution of agriculture to GDP fell from around 7% (6.71%) in 1966 to below 1% (0.62%) by 2006. The annual percentage rate of decline was -4.8%.

As seen in Chart 4, the percentage contribution of the agri-food sector to GDP fell from above 9% (10.44%) in 1969 to around 5% (4.72%) by 2006. The annual percentage rate of decline was -1.1%. Thus although the agri-food sector has declined in relative importance recently, its decline has been low and very slow, as opposed to the much more rapid decline of the agriculture (-4.8%). Also as hypothesized, the agri-food sector continues to make a much greater percentage contribution

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[8] This figure is the constant proportional growth rate of the All Items Index of Retail Prices for Trinidad and Tobago from 1991 to 2006.

to GDP than agriculture, 7.6 times more in 2006.

Contribution to the Agri-food Sector of its Sub-Sectors

Agriculture

Chart 5 provides the trend of the percentage contribution of agriculture (AGRI) to Agri-food (AGRIF) defined earlier as CAGRIAG. Here it is seen that the linear equation provides a slightly better fit to the data. Both equations show nevertheless that agriculture was making a declining contribution to the agri-food sector over the period with a constant proportional decline of -3.67% per annum over the period.

Restaurants

Chart 6 provides the trend of the percentage contribution of Restaurants to Agri-food defined earlier as CAGRIRES. Here it is seen that there has been a strong exponential growth trend of 6.15% per annum over the data period. This trend contrasts markedly with the declining trend of agriculture of -3.67%.

Wood and Related Products

Chart 7 provides the trend of the percentage contribution of Wood and related products to Agri-food defined earlier as CAGRIWRP. Here it is

seen that there has been a weak exponential decline of the contribution of this sub-sector of -1.35% per annum over the data period.

Food Drink and Tobacco

Chart 8 provides the trend of the percentage contribution of "Food drink and tobacco" to Agri-food defined earlier as CAGRIFDT. Here it is seen that there has been a weak exponential increase of the contribution of this sub-sector of 1.68% per annum. This growth more than compensates for the -1.35% per annum decline of the contribution of "Wood and related products" over the data period.

Food Trade of USA with Trinidad and Tobago

Chart 9 and Chart 10 show the trends for the United States of total exports to and total imports from Trinidad and Tobago over the period 1985 to 2006. The most noticeable feature of these charts is the negative balance of trade that the United States has with Trinidad and Tobago. For 2006 for example the total imports of $8,362.4 million were 5.18 times the total exports of $1,614.6 million[9].

The total exports showed a strong exponential growth trend with an annual percentage growth rate of 6.56%. On the other hand, the total imports of the United States from

[9] All figures in US dollars

Trinidad and Tobago showed a very steep rate of growth from 2003 associated with the rising oil prices that have existed since the start of the war in Iraq. Imports over the period grew at an annual percentage rate of 10.21%.

Table 1 provides a view of the nature of the trade between the United States and Trinidad and Tobago. Here it is seen that mineral fuels and related materials (petroleum products) comprise 63.3% of the imports of the USA with other chemicals and related products comprising 31.2%. Imports of agricultural products (Codes 0, 1 and 4) comprise only 1% of total imports. Exports are dominated by machinery and transport equipment 42.4%, followed by chemicals and related products 13.3% and agricultural products 10.3%.

Chart 11 illustrates the time trend of the percentage of agricultural exports to total exports from the United States to Trinidad and Tobago. Here it is seen that this percentage has dropped from about 21% in 1990 to 10% in 2006. The rate of decline has been about -4.42%, over the data period of 1989 to 2006.

Notwithstanding its declining percentage contribution to total exports from the USA to Trinidad and Tobago, agricultural exports have been rising at an annual percentage growth rate of 2.93% as illustrated in Chart 12. This is however a low rate of growth compared with the growth

rate of total exports which was seen above to be 6.56% per annum.

As seen in Chart 13, Grain and feed exports dominate the exports of agricultural products from the United States to Trinidad and Tobago although this domination has been declining over time at a slow rate of decline of -1.17%.

Regression Analysis

Regression analysis was conducted to determine the relationship between "agricultural exports from the United States to Trinidad and Tobago" (AGRIX) and the "percentage contribution of agriculture to agri-food" (CAGRIAG). Since the agricultural exports variable showed a strong upward time trend, a time trend (YEAR) was included in the regression analysis. However other variables were not included, because of the paucity of degrees of freedom.

The results (Appendix Table 1) again showed the strong upward trend to agricultural exports, which no doubt accounted for the good fit to the data by the regression equation. The Breusch-Godfrey test showed the absence of auto correlation in the regression. The estimated coefficient of CAGRIAG though insignificant at the 5% level of significance suggested that for every 10% drop in the percentage contribution of agriculture to agribusiness, there was an approximate 1% increase in the level of agricultural exports from the USA to

Trinidad and Tobago.

Conclusions

The study showed that in Trinidad and Tobago, the "agri-food" sector has shown greater growth and contribution to the economy than agriculture. Whereas the agri-food sector has grown over the last 20 years at a rate of growth per annum of 9.2%, and still makes about a 5% contribution to GDP, agriculture grew at an annual rate of 5.5% and now makes less than a 1% contribution to GDP.

Also, whereas over the data period agriculture was making a declining contribution to the agri-food sector, the "Restaurants" sub-sector was making a rapidly increasing contribution to the agri-food sector. The percentage contribution of Wood and related products fell slowly and the percentage contribution of "Food drink and tobacco" rose slowly also.

The study also showed that agricultural exports from the United States to Trinidad and Tobago have also been making a declining percentage contribution to total exports of the USA to Trinidad and Tobago. However the agricultural exports have been increasing at an annual percentage rate of 3% per annum.

Regression analysis was used to determine the relationship between the declining importance of primary agriculture in agribusiness in Trinidad and Tobago and the level of

agricultural exports from the United States. The results suggested that every 10% drop in the percentage contribution of agriculture to the agri-food sector, there may be an approximate 1% increase in the level of agricultural exports from the USA to Trinidad and Tobago. This would be a fairly inelastic response. However the lack of a longer time series of data probably prevented significant results from being obtained.

The results of the study suggest that there should be scope for expanding domestic production of food in Trinidad and Tobago especially to supply the restaurant sub sector. The production of higher income elastic foods should be expanded locally since these foods should find a larger market with rising consumer income. Such linkage between agribusiness and the agricultural sector can be encouraged by appropriate commodity value chain development.

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Table 1: U.S International Trade Statistics: Value of Exports and General Imports by Country by 1-digit Commodity Groupings[1] - Trinidad and Tobago (2740)

SITC	Desc	Cumulative year to date April 2007	
		Exports	General Imports
		F.A.S.Value Basic	C.I.F Value Basis
0	Food and live animals	51992	21462
1	Beverages and tobacco	3545	2931
2	Crude materials, inedible, except fuels	8603	827
3	Mineral fuels, lubricants and related materials	32974	2035125
4	Animal and vegetable oils, fats and waxes	1170	-
5	Chemicals and related products, n.e.s.	73324	1003792
6	Manufactured goods classified chiefly by material	64788	124317
7	Machinery and transport equipment	233859	2509
8	Miscellaneous manufactured articles	40686	3374
9	Commodities and transactions not classified elsewhere in the SITC	40983	19236
	Total	551924	3213575

[1]In Thousands of US Dollars.(-) represents zero
Source: U.S. Census Bureau
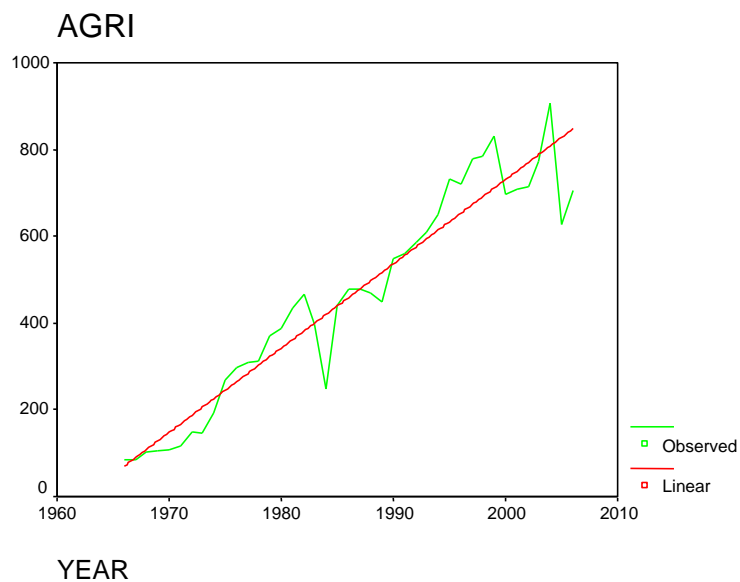
AGRI

$$AGRI = -38145 + 19.44 \ Year$$
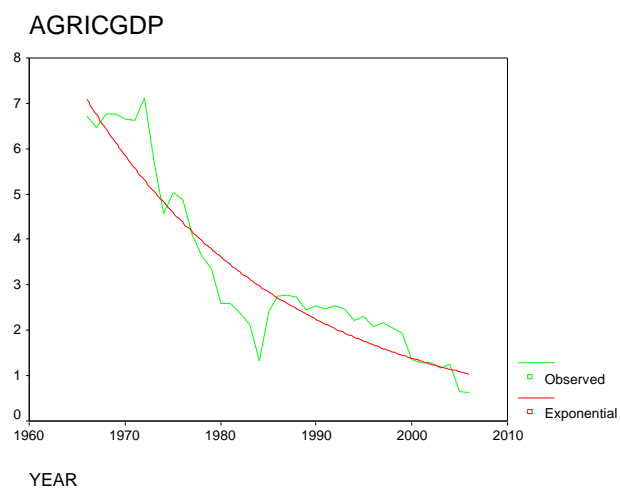$$Rsq = .919 \quad F = 439.79 \quad Sigf = .000$$

Chart 1: Time Trend of Output of Agriculture - AGRI
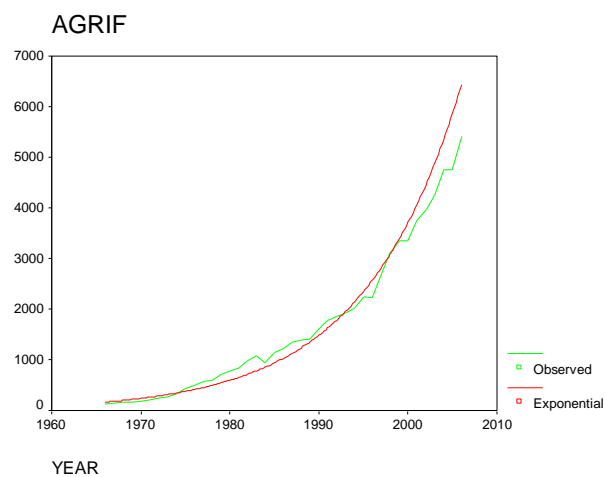
AGRIF

$$Ln(AGRIF) = -175.06 + 0.0916 \text{ Year}$$
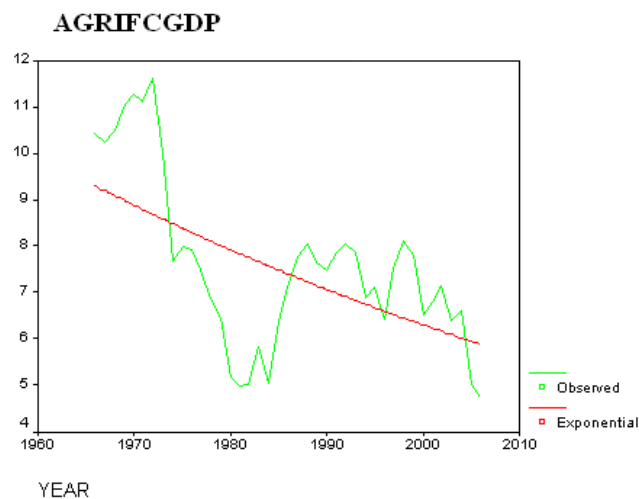$$Rsq = .974 \quad F = 1443.98 \text{ Sigf} = .000$$

Chart 2: Time Trend of Output of the Agri-food Sector – AGRIF

AGRICGDP

$$Ln(AGRICGDP) = 96.43 - 0.048 \text{ Year}$$
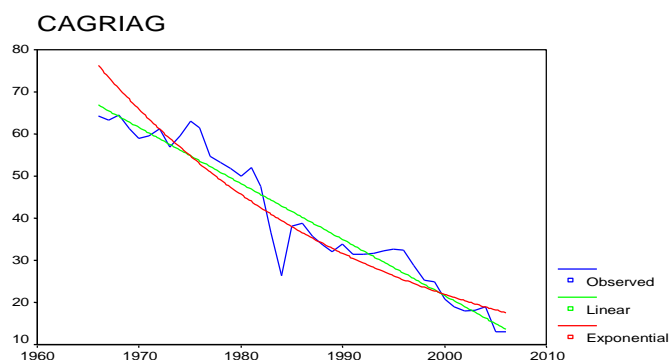$$Rsq = .844 \quad F = 211.60 \text{ Sigf} = .000$$

Chart 3: Time Trend of the Percentage Contribution of Agriculture to GDP

AGRIFCGDP

Ln(AGRIFCGDP) = 24.71 -0.011 Year
Rsq = .324   F = 18.71 Sigf = .000

Chart 4: Time Trend of the Percentage Contribution of Agri-food Sector to GDP (AGRIFCGDP)
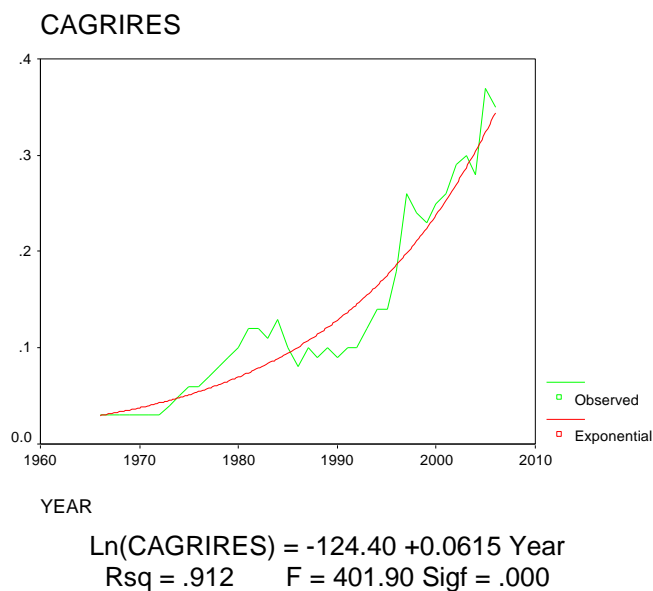
CAGRIAG

Linear:
      CAGRIAG = 2680.98 -1.3297 Year
      Rsq = .935   F = 563.87   Sigf = .000
Exponential:
      LN(CAGRIAG) = 127.05 -.0367 Year
      Rsq = .905   F = 371.79   Sigf = .000

Chart 5: Contribution of Agriculture to the Agri-food Sector - CAGRIAG

CAGRIRES

Ln(CAGRIRES) = -124.40 +0.0615 Year
Rsq = .912   F = 401.90 Sigf = .000

Chart 6: Contribution of Restaurants to the Agri-food Sector - CAGRIRES

CAGRIWRP

Ln(CAGRIWRP) = 23.62 -0.0135 Year
Rsq = .235   F = 11.19 Sigf = .001
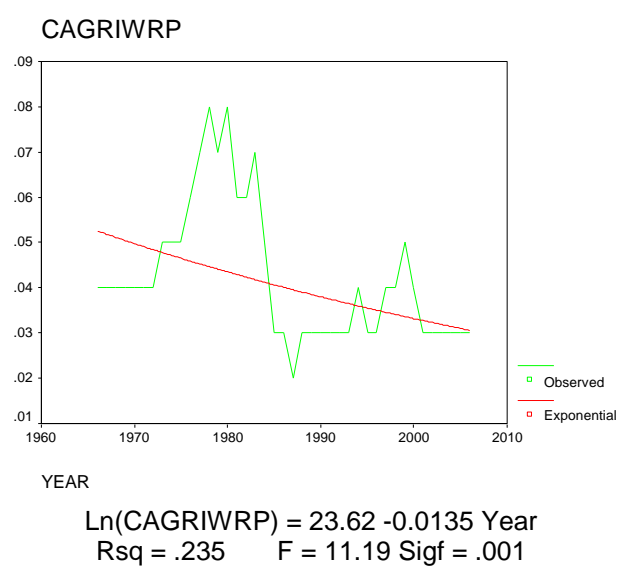
**Chart 7: Contribution of Wood and related products to the Agri-food Sector
- CAGRIWRP**

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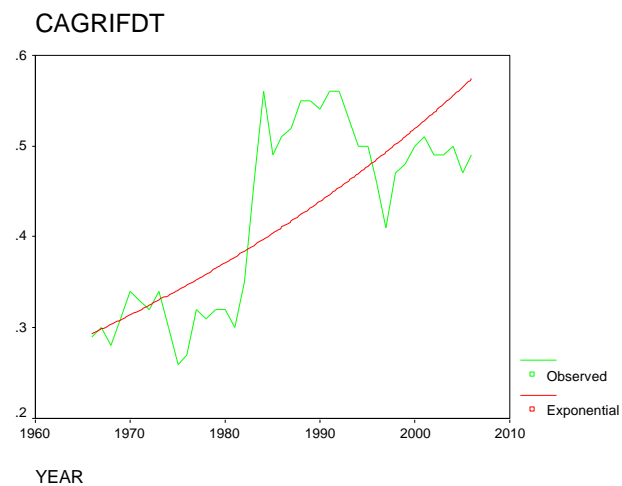
CAGRIFDT

$$Ln(CAGRIFDT) = -34.20 + 0.0168 \text{ Year}$$
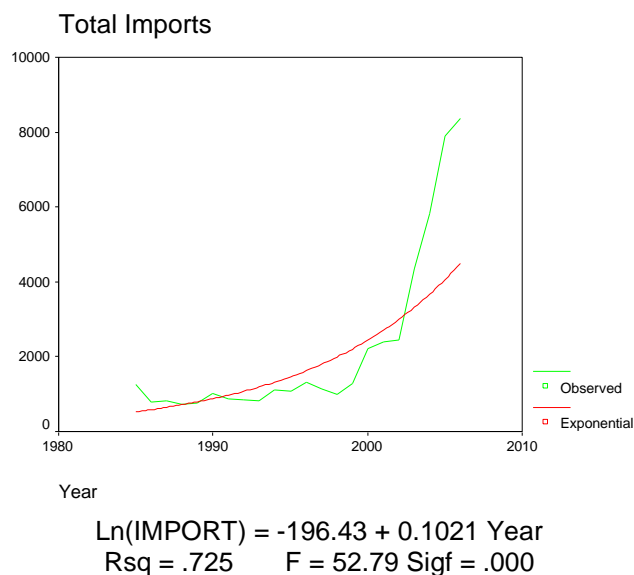$$Rsq = .617 \qquad F = 62.76 \text{ Sigf} = .000$$

Chart 8: Contribution of Food drink and tobacco to the Agri-food Sector - CAGRIFDT
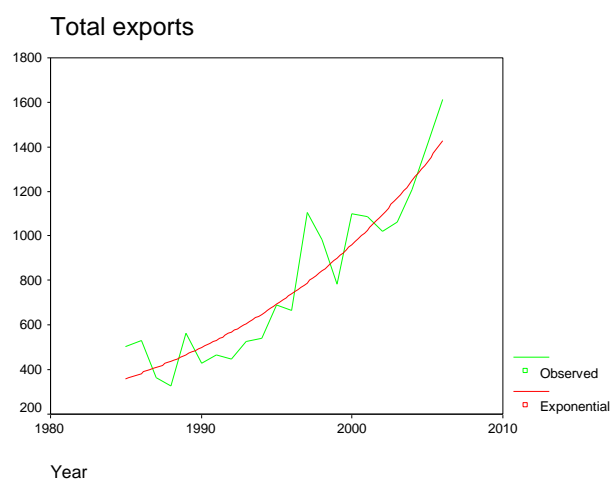
Total exports

$$Ln(TEXPORT) = -124.24 + 0.0656 \text{ Year}$$
$$Rsq = .839 \qquad F = 104.36 \text{ Sigf} = .000$$

Chart 9: Time Trend of Total Exports from the United States to Trinidad and Tobago (TEXPORT)

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Total Imports

Ln(IMPORT) = -196.43 + 0.1021 Year
Rsq = .725   F = 52.79 Sigf = .000

Chart 10: Time Trend of Total Imports from the United States to Trinidad and Tobago (IMPORT)

Agric Exports as % Total Exports

Ln(AGXTTOTX) = 90.96 - 0.0442 Year
Rsq = .70   F = 37.34 Sigf = .000
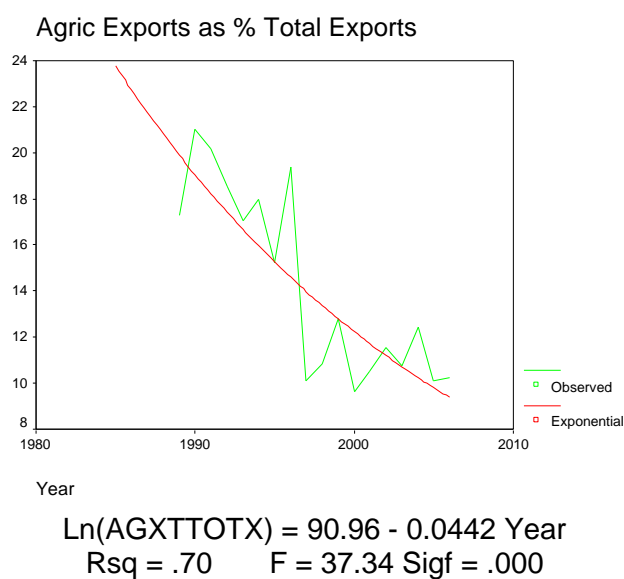
Chart 11: Time Trend of Agricultural Exports (AGRIX) as % of Total Exports (TEXPORT) from the United States to Trinidad and Tobago (AGXTTOTX)

Agricultural Exports
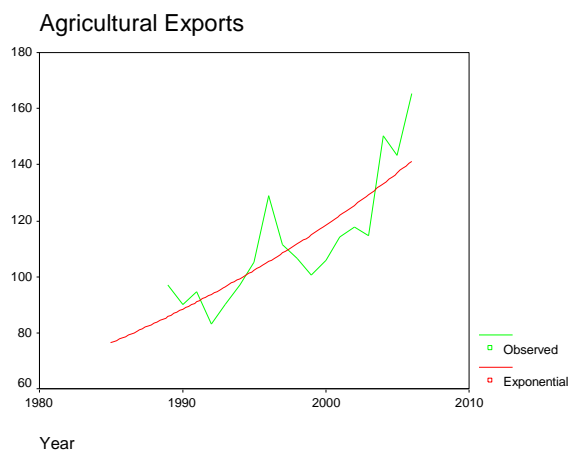
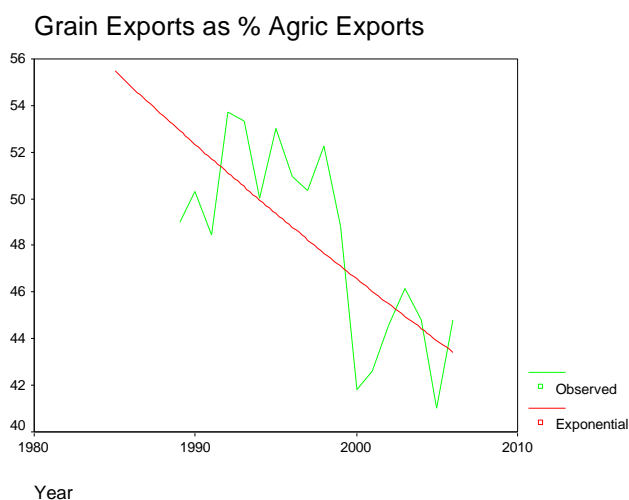$$Ln(AGRIX) = -53.78 + 0.0293 \text{ Year}$$
$$Rsq = .70 \qquad F = 37.28 \text{ Sigf} = .000$$

Chart 12: Time Trend of Agricultural Exports from the United States to Trinidad and Tobago (AGRIX)

Grain Exports as % Agric Exports

$$Ln(GRTAG) = 27.17 - 0.0117 \text{ Year}$$
$$Rsq = .522 \qquad F = 17.51 \text{ Sigf} = .001$$

Chart 13: Time Trend of Grain and Feed Exports as a % of Total Agricultural Exports (AGRIX) from the United States to Trinidad and Tobago (GRTAG)

APPENDIX

Table 1: Regression Analysis

Dependent Variable: LOG(AGRIX)				
Method: Least Squares				
Date: 07/22/07 Time: 15:00				
Sample: 1 18				
Included observations: 18				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PCAGRIAG)	-0.108272	0.084441	-1.282221	0.2192
LOG(YEAR)	48.21546	12.33023	3.910347	0.0014
C	-354.6009	93.81186	-3.779915	0.0018
R-squared	0.728914	Mean dependent var		11.60891
Adjusted R-squared	0.692769	S.D. dependent var		0.186823
S.E. of regression	0.103553	Breusch-Godfrey Serial Correlation LM Test		
Sum squared resid	0.160848	Prob(Obs*R-squared)		0.566021
Log likelihood	16.91810	F-statistic		20.16652
Durbin-Watson stat	1.370520	Prob(F-statistic)		0.000056

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	0.438780	Probability		0.654028
Obs*R-squared	1.138247	Probability		0.566021
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 07/22/07 Time: 15:10				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PCAGRIF)	-0.021152	0.094344	-0.224206	0.8261
LOG(YEAR)	-0.385771	12.92950	-0.029837	0.9767
C	2.975112	98.37744	0.030242	0.9763
RESID(-1)	0.229603	0.290226	0.791119	0.4431
RESID(-2)	0.109074	0.310309	0.351501	0.7308
R-squared	0.063236	Mean dependent var		7.26E-14
Adjusted R-squared	-0.224999	S.D. dependent var		0.097271
S.E. of regression	0.107659	Akaike info criterion		-1.389557
Sum squared resid	0.150677	Schwarz criterion		-1.142231
Log likelihood	17.50601	F-statistic		0.219390
Durbin-Watson stat	1.787975	Prob(F-statistic)		0.922856