

Hydrocarbon Exports and Food Insecurity in a Small Petroleum Rich Economy

The concept of deagriculturalization has been shown to be associated with the Dutch Disease, a phenomenon which has plagued the T&T economy since the 1990s. Deagriculturalization refers to the premature decline of the agricultural sector. In the case of the Trinidad and Tobago economy, the cause of the relative decline in the size and contribution of the agricultural sector can be attributed to the impact of the boom in the hydrocarbon sector. The implications of this decline have far reaching negative effects on the economy's ability to 'feed itself'. The FAO has provided a four (4) dimensional approach to understanding an economy's food security status. The key variables that are associated with and hence characterize food security are therefore Accessibility, Availability, Stability and Utilization. This paper shows that on every front the T&T economy is food insecure and within the context of the Dutch Disease, the revival and sustainable development of the agriculture sector is critical to the economy's food security position.

Introduction

In the postwar era there have been profound changes in Caribbean economies and associated with these changes have been a decline in the importance of the agricultural sector. This shift away from the agricultural sector has been most pronounced in the T&T economy, the only CARICOM producer of crude oil and petrochemicals. In a world characterized by increasing concerns regarding food security, the demise of the agricultural sector in any nation state is a cause for concern. To entreat these problems, the trigger factors for this type of situation has to be properly understood, before any logistical attempt at reversing the condition can to be seriously considered.

The FAO in 2002 defined food security as '*a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life*'. The FAO later determined that there were four dimensions associated with the concept; these are availability, accessibility, utilization and stability (FAO 2007).

This paper attempts to show that indeed the T&T economy, a small oil producing economy in the Caribbean, is food insecure along each of the defined dimensions of the term. The rest of the paper is developed as follows; the next section briefly discusses the theoretical links between food security and agriculture after which the specifics of the T&T food security position is then presented. This will be followed by some other sector specific challenges facing the agricultural sector. The paper then closes with some of the agricultural sector initiatives undertaken by the government of Trinidad and Tobago as well as some of the policies expected to be put in place over the medium term period.

Agriculture and Food Security

The key variables that are associated food security as noted above are Accessibility, Availability, Stability and Utilization (FAO 2007). These various dimensions of food security are very much linked to the sustainability and viability of the agricultural sector.

Accessibility as it pertains to agriculture and food security relates to whether or not the population has access to the right combination of foods at the right prices for a balanced diet.

Accessibility, however, according to FAO's focus C¹, relates to having *enough to eat*. The article notes that food accessibility is even more critical than food availability. Even so Amartya Sen, mirrored this position and noted that “*starvation is a matter of some people not having enough food to eat and not a matter of there being not enough to eat*”. Sen noted that this situation is no more obvious than in rural areas where ironically food is being produced.

Availability relates to variety as well as whether or not domestic production can satisfy the local demands for food. Stability or vulnerability is concerned with the various threats to food security including a declining agricultural sector.

Timmer (2004) notes that the relationship between food security and economic growth is mutually reinforcing, and as such explicitly identifies that the agricultural sector plays a critical and dynamic role towards the achievement of economic growth, poverty reduction and stability of the domestic food system. From a macroeconomic perspective, improvements in these three dimensions must occur simultaneously, which no doubt poses serious challenges to policy makers. For instance, economic growth must equitably reach the poor in society, if not income distribution and poverty could worsen; a situation which would precipitate negative externalities and can even reverse the positive effects of growth.

On the other hand sustained interventions to reach the impoverished must be supported by income increases which can only be achieved through economic growth. Even so reducing the number of persons who live below the poverty line does not necessarily imply that they become more food secure, what is necessary is that complementary measures must be put in place to ensure that the food supply on the market is adequate and that the markets themselves are stable enough so that prices do not rise beyond their means.

By integrating these goals into strategically developing the agricultural sector, poverty can be reduced, economic growth achieved and food security attained. This integrated outlook of the food economy is held together by agriculture and the rural economy.

A brief description of the T&T economy

The Table below shows the trends in oil production, oil price, natural gas production and real economic growth for the T&T economy for the time period 1966-2008. In 1966 oil production was 55.6 million barrels. Production levels peaked in 1978 at a level of 83.8 million barrels. By 2008 however production had fallen to 41.8 million barrels. Oil prices increased persistently, from US\$1.3 in 1966 to US\$33.5 in 1982, and thereafter declined. In 2000 the price of oil recovered to US\$30.2. Since 2002, however, the price per barrel of oil has increased significantly even reaching US\$99.6 by 2008. Natural gas production has increased continually. The production level in 2006 was more than 1000% in 1966. Additionally, since 1992 the T&T economy has experienced persistent real economic growth.

¹ Focus C What are the links between agricultural production and food security?

	Oil production 000 barrels	Crude Oil prices (WTI US\$ barrel)	Natural Gas Production mmc	Real GDP growth
1966	55603	1.3	3367.6	
1967	64995	1.3	3973.9	2.00
1968	66904	1.3	4288.4	5.20
1969	57429	1.3	3893.5	2.70
1970	51043	1.3	3428.0	3.50
1971	47144	1.7	3109.6	1.00
1972	51211	1.9	2954.5	5.80
1973	60670	2.7	3397.4	1.70
1974	68136	9.8	3632.8	3.80
1975	78621	10.7	3580.2	1.50
1976	77673	11.5	3906.5	6.40
1977	83609	12.4	4236.2	9.10
1978	83809	12.7	4471.3	10.00
1979	78209	17.3	4805.4	3.60
1980	77608	28.7	5601.0	10.40
1981	69109	32.5	5604.1	4.60
1982	64621	33.5	5841.0	(5.89)
1983	58340	29.3	6318.3	(4.73)
1984	61897	28.5	7229.0	(0.10)
1985	64361	28.0	7550.0	(23.87)
1986	61652	15.0	7584.7	(6.15)
1987	56642	17.3	7672.3	(27.07)
1988	55208	17.0	7442.2	9.11
1989	54509	19.6	7244.0	19.28
1990	55039	24.1	6645.5	9.24
1991	52423	21.6	7411.5	(4.39)
1992	49195	20.6	7483.6	2.31
1993	44633	18.5	7077.6	0.50
1994	47235	17.1	7695.4	0.24
1995	47576	18.4	7757.4	10.44
1996	47112	20.2	9058.0	5.16
1997	45166	20.4	9137.0	6.87
1998	44759	14.4	10294.0	7.67
1999	45688.9	19.2	13240.0	10.68
2000	43680.5	30.2	15473.6	11.00
2001	41521.3	28.6	16485.8	4.18
2002	47706.6	25.9	18861.6	7.93
2003	48981.1	31.7	26794.0	14.41
2004	44984.7	41.5	30255.0	8.82
2005	52739.6	56.5	33155.7	5.38
2006	52104.8	66.0	39943.4	13.51
2007	43807	72.3	41787.1	4.62
2008	41826	99.6	41694.4	2.30

The rest of this paper now substantially evaluates the food security position of the T&T economy.

Food Security in Trinidad and Tobago

Core Issue 1: Availability

Availability, as it pertains to food security at the national level, relates to the quantities of food available for the population in sufficient quantities and quality, supplied through domestic production or imports, including food aid (UN 2009). The discussion focuses on the time period 1981 to 2008 so as to avoid double splicing the data².

In the T&T economy, agriculture GDP expanded from TT\$499mn in 1981 to TT\$611mn in 1993, an increase of 22.5%. However, between 1993 and 2008 real agricultural GDP declined by some 23% to TT\$468.8 mn. Agricultural GDP as a proportion of total GDP increased from 1% in 1981 to 1.96% in 1993, after which the ratio, declined persistently to 0.51% in 2008. Clearly the absolute size as well as the relative size of the agricultural sector as a whole, has declined³. (See Table X).

² The Central Statistical Office has historically published real GDP values since 1966. However over time the base year has changed from 1970, to 1985 and lastly 2000. National income figures in 2000 base year was recalculated and published from 1995. This implies that the data period 1981 to 1994 would have been published most recently in 1990 base year prices. To obtain a consistent series the data for 1981 to 1994 was rebased into 2000 prices. Data prior to 1981 which was posted in 1970 price levels and was left out on the presumption of the distinctiveness of the weights, to that used in 2000.

³ Hosein and Gookool (2010) have established that one of the long run determinants of the RER is the price of oil. The modeling exercise will therefore now focus on whether or not the appreciation of the real exchange rate resulted in the decline both absolutely and relatively in the agricultural sector. The variables being considered as dependent at this stage would be sector specific output, and employment. To investigate whether or not the appreciation of the real exchange rate resulted in the absolute and relative decline of agricultural sector formal econometric processes must be employed. In particular each of the following models is to be tested.

$$\ln(\text{growth rate of } \frac{\text{Real agri GDP}}{\text{Real GDP}}) = b_0 + b_1 \ln(\text{RER}) + b_2 \ln(\text{agricultural exports}) \quad (1)$$

$$\ln(\text{growth rate of } \frac{\text{Real exp ort agri GDP}}{\text{Real GDP}}) = b_0 + b_1 \ln(\text{RER}) + b_2 \ln(\text{agricultural exports}) \quad (2)$$

$$\ln(\text{growth rate of } \frac{\text{Real domestic agri GDP}}{\text{Real GDP}}) = b_0 + b_1 \ln(\text{RER}) + b_2 \ln(\text{agricultural exports}) \quad (3)$$

Note that agricultural exports is used as a proxy for foreign demand for locally produced agricultural goods which can positively impact on the absolute as well as the relative size of the agricultural sector.

Table: Real Value Added in Agriculture TT\$ mn (2000 = 100)				
	Agriculture	Export Agriculture	Domestic Agriculture	Sugar Industry
1981	499.02	48.36	279.21	171.45
1993	611.53	33.75	394.81	182.97
2008	468.80	7.20	329.30	132.30
1981-1993	22.55	(30.20)	41.40	6.72
1993-2008	(23.34)	(78.67)	(16.59)	(27.69)
1981-2008	(6.1)	(85.1)	17.9	(22.8)
Shares in Real GDP				
1981	1.04	0.10	0.58	0.36
1993	1.96	0.11	1.26	0.59
2008	0.51	0.01	0.36	0.14

The level of real value added in export agriculture in T&T contracted from TT\$48.4mn in 1981 to TT\$33.7mn in 1993. This trend decline continued until 2008 when real value added in export agriculture was recorded at a mere TT\$7.2mn. The domestic agricultural sector prospered during the recession which ensued after 1981 and in 1993 the sector's value added of TT\$394.8mn was 41.4% more than the TT\$279.2mn which prevailed in 1981. By 2008 value added in domestic agriculture, however, had declined to TT\$329.3mn, a decrease of 18% from its value in 1981.

The sugar industry in T&T has been dealt several blows between 1981 and 2008; among these was the restructuring of Caroni 1975 Ltd into the Sugar Manufacturing Company in 2003⁴. The real value added of the sugar sector decreased from TT\$171.4mn in 1981 to TT\$132.3mn in 2008, a decrease of 22%.

The demise of the agricultural sector has no doubt been linked to the resource movement effect and spending effect associated with the Dutch Disease. The decline in the agricultural sector on account of the Dutch Disease effects is known as deagriculturalization. This category of deagriculturalization, however, must not be confused with the natural process of agricultural decline associated with economic growth as noted by Ramaswamy (1998) and Chenery et. al. (1986). In fact the latter notes that over time an economy undergoes a structural change in the composition of its output. The literature suggests that this process is natural and inevitable as an economy progresses through the various stages of development. However, in relation to the Dutch Disease, deagriculturalization may be prematurely induced on account of a boom in one aspect of the tradable sector. An economy affected by the Dutch Disease experiences a decline in its external competitiveness, as its real exchange rate appreciates (see Hosein 2010 and Neary 1982).

Note that the correlation between the RER and the oil price over the period 1981-1994 was 60%, whilst over the 1994-2008 period, the correlation increased to 96%. **Table** below summarizes these correlations between the real exchange rate and output and the real exchange rate and employment in the agricultural sector. In the first panel correlations are calculated using real GDP

⁴ Caroni (1975) was a state owned sugar producing company which was acquired from Tate and Lyle in the early 1970s. The company also produced rice, citrus, and rum. Since 2002, however, the company has been restructured into the Estate Management Company of Trinidad and Tobago employing only a fraction of the original labor force. Only the Caroni Rum Distilleries remain operational.

and employment levels, while in the second panel, correlations are calculated using the respective sectors' share in total GDP and total employment. For all the various subsectors over the entire time period, there was a negative correlation between the RER and the various sector indicators. These correlations are stronger for the boom period (1994-2008), than for the recession and structural adjustment recovery period (1981-1993). The **Table** below provides the strong argument that agriculture has been both absolutely and relatively deagriculturalized as a consequence of the appreciation of the real exchange rate⁵.

Correlation scores between the RER and real GDP, Real GDP distribution, employment and employment distribution						
Absolute Deagriculturalization						
	Real GDP			Employment		
	Total Agriculture	Export Agriculture	Domestic Agriculture	Total Agriculture	Export Agriculture	Domestic Agriculture
1981-1993	(0.50)	(0.62)	(0.20)	(0.51)	(0.64)	(0.15)
1994-2008	(0.78)	(0.75)	(0.75)	(0.89)	(0.91)	(0.76)
Relative Decline						
1981-1993	(0.56)	(0.71)	(0.45)	(0.51)	(0.71)	(0.23)
1994-2008	(0.91)	(0.90)	(0.88)	(0.86)	(0.90)	(0.79)

The Table below provides some useful Granger causality results between real agricultural GDP, the oil price, government oil revenue and the real exchange rate⁶. At a 5% level of significance the following hypotheses cannot be rejected

- 1) The oil price does not granger cause real agricultural GDP
- 2) Oil revenue does not granger cause real agricultural GDP and
- 3) The RER does not granger cause real GDP.

Null Hypothesis:	F-Statistic	Prob.
DDOIL\$ does not Granger Cause DRAGRIGDP	2.84	0.07
DRAGRIGDP does not Granger Cause DDOIL\$	1.86	0.17
DDOILREV does not Granger Cause DRAGRIGDP	1.19	0.32
DRAGRIGDP does not Granger Cause DDOILREV	5.78	0.01
DRER does not Granger Cause DRAGRIGDP	0.33	0.72
DRAGRIGDP does not Granger Cause DRER	0.47	0.63

The decline of the agricultural sector has been on account of several reasons. Particularly, the sector has suffered a tremendous loss in capacity due to labor movements out of the sector as a consequence of both direct deagriculturalization, where labor flowed out of agriculture and

⁵ The Central Statistical Office (CSO) classifies the T&T agriculture sector into three categories, export agriculture, sugar and domestic agriculture. For the purpose of this study, export agriculture following the CSO, consists of sugar, cocoa, coffee and citrus whilst domestic agriculture covers a wider range of commodities inclusive but not constrained to the following; coconut growing, bananas and plantains, rootcrops, pulses, vegetables, tobacco and rice, poultry and eggs, dairy beef and other meat, pork fattening, state lands, forestry, fishing, and agricultural services.) sector is treated as part of the NBT segment of the agricultural sector whilst the domestic agriculture sector is treated as the NT segment of the agricultural sector.

⁶ Apply to employment

directly into the booming tradable energy sector, as well as indirect deagriculturalization, where labor flowed out of agriculture and into the NT service oriented sectors of the economy.

Consider the **Table** below which illustrates this dilemma. From an employment perspective agriculture employed 43,700 people in 1981. This increased by 5.5% to 46,100 workers in 1993 but by 2008 had declined to 23,600. In 2008, the number of workers employed in the agricultural sector was a mere 54% of the 1981 level. Employment in export agriculture declined from 3,300 in 1981 to 900 in 2008, a decrease of 73%. In the domestic agriculture sector employment increased from 26,800 to 30,700 between 1981 and 1993, but then subsequently declined to 21,600 in 2008. The fall off in employment in the sugar sector was pronounced, declining from 13,600 in 1981 to 1,100 in 2008.

	Agriculture	Export Agriculture	Domestic Agriculture	Sugar Industry
Employment by industrial sector				
1981	43700	3300	26800	13600
1993	46100	2800	30700	12600
2008	23600	900	21600	1100
1981-1993	5.49	(15.15)	14.55	(7.35)
1993-2008	(48.81)	(67.86)	(29.64)	(91.27)
1981-2008	(46.00)	(72.73)	(19.40)	(91.91)
Source: The Review of the Economy (various years)				

Apart from declining employment, the agricultural population is aging and this has serious implications for future food availability. From the **Table** below, there has been a relative increase in the number of farmers in the age groups 25-44 and 45-64, and a decline in the number of farmers under the age of 25, thus emphasizing that the agricultural population is indeed aging. Note that in every age category identified there has been an absolute decline in the number of farmers.

Table x: Number of Holders by Age Group, for T&T 1982, and 2004				
1982 Agricultural Census Report				
Total All Ages	Under 25 years	25-44	45-64	65 years and over
30422	916	10222	14093	5167
2004 Agricultural Census Report				
19051	439	6698	9021	2893
Source: Agricultural Census Report (various years).				

The Youth Apprenticeship Program in Agriculture (YAPA). This program designed by the government to stimulate participation in agriculture entrepreneurship among young people between the ages of 17 to 25. *It was launched in 2003 and its primary purpose is to provide an opportunity for young people to become involved in farming. It is expected that this experience will show them that farming can be pursued successfully as a career and in a business –like manner. This should have the desired outcome of increased numbers of young persons entering the agriculture sector, a necessity for sustainable agricultural development. The program is linked to overall policy goals of food security, poverty alleviation, employment and rural development.* Although YAPA has been making some strides to reverse this trend, many of the trainees are concerned with the relatively lower agricultural wages and inability to access credit to start their own agri businesses (Webster et al 2008)⁷. The number of YAPA participants at every

⁷ Promoting Agriculture and Food Sustainability through Apprenticeship Programs in the Caribbean: A Case Study in Trinidad and Tobago

stage of the program continues to decline as more attractive opportunities emerge for higher salaries and minimal work in ‘make-work’ programs such as the Community-based Environmental Protection and Enhancement Programme (CEPEP) and the Unemployment Relief programme (URP) schemes, as well as in the petrochemical sector⁸. The relative unattractiveness of agriculture viz a viz the petroleum sector and other service type oriented employment prospects persists because of the peculiarities associated with the governance in oil based economies. This phenomenon is known as the resource curse which arises as a result of the mismanagement of oil revenues. Programs which would be unsustainable if oil revenues weren’t forthcoming now become possible. In the T&T case, programs such as CEPEP and URP are classic examples of what ‘not to do’ during an oil boom. These programs do not effectively increase the output of the economy commensurate with the expenditure outlay for the program itself. Such programs are virtual handouts that create a culture of dependency and foster bad work ethics and practices, the consequence of which is that often times labor flows into these programs and out of the productive sectors. Obtaining farm labor in agriculture for instance is a problem because of the challenges posed by the resource curse.

One option available to farmers in this regard is to mechanize their operations; however, land tenure remains an issue as many farmers do not have legitimate access to the lands that they cultivate. As a consequence obtaining loans for machinery to mechanize farm operations is difficult. The **Table** below shows that the total number of agricultural parcels has decreased and so too those parcels owned, rented or leased. Although the number of holders squatting on government lands decreased, the incidence of squatting on lands belonging to state enterprises and other private individuals has increased. The ‘otherwise held’ category includes those parcels of rent free or family owned land on which agriculture is practiced. Note that there has been a decline in the number and area of owned parcels of land. This can pose a binding constraint towards agriculture, such that proof of tenure is often a prerequisite to credit.

Number and Area of All Parcels on Private Holdings by Type of Tenure									
1982 Agricultural Census Report									
			Rental / Leased			Squatting			
	Total All Types	Owned	Government	State Enterprise	Private	Government	State Enterprise	Private	Held Otherwise
Number of Parcels	43456	19877	4646	3290	8446	3705	453	541	2498
Area (Ha)	13157.2	93156.6	9272.2	39888.9	10427.6	5044.7	563.3	632.4	8031.3
2004 Agricultural Census Report									
Number of Parcels	26 031	9 023	4 215	2 148	2 646	2 979	902	626	3492
Area (Ha)	51 080.4	21 985.0	8 280.9	3 302.8	4 146.7	4 992.7	1 320.9	808.7	6242.5
Source: Agricultural Census Reports (various years)									

Agricultural lands also remain underdeveloped with inadequate infrastructure (access roads, drainage and irrigation). This type of policy neglect is again linked to the resource curse to the extent that, in an environment of ‘resource wealth’ promoting diversification and even

⁸ Mary King an independent government senator in an article published on Monday 11th January 2010 in the Trinidad Express titled noted, “We boast of low unemployment yet we transfer some \$500 million a year to make-work projects in URP and CEPEP. Indeed the Government has to be directly involved in creating jobs in the diversified knowledge-based economy. But surely these have to be well-paying, sustainable and, in these days, some in globally competitive companies. This transfer of rents to make-work projects and the other pseudo training schemes may be politically expedient though socially and economically inefficient as a static economic objective”.

strengthening of traditional export sectors are delayed. As Auty (2000), noted, *resource-abundant economies are the type of economies that are eligible for postponing economic reforms*⁹. A tremendous amount of ‘foot dragging’ occurs in such environments, the evidence of which is an increase in easily preventable problems. For example, the Table below shows that there has been a drastic increase in the amount of holdings which experience flooding problems.

Number of Holdings Subject to Flooding
1982 Agricultural Census Report
963
2004 Agricultural Census Report
6928
Source: Agricultural Census Reports (various years)

These inherent structural problems provide evidence of the resource curse at work and how severely these problems have affected the agricultural sector’s capacity to produce, the consequence of which is that long run food availability has been compromised.

Food availability in this context also relates to diversity and variety of food required in order to achieve a balanced diet. The **Table** below shows some of the trends in the demand gaps for selected commodities in each of six food groups identified for as part of a balanced diet by the Ministry of Agriculture, Land and Marine Resources of T&T (2008).

Domestic Gap for Selected Agricultural Products in T&T						
Product	Import Tonnes	Local Production Tonnes	Export Tonnes	Consumption Tonnes	Domestic Gap (consumption – local production)	Demand Gap as a % of Imports
Root Crops Local Staples						
Fresh White Potato	25510		563	24947	24947	97.79
Sweet Potato	468	1654	3	2119	465	99.36
Dasheen	780	1625	1	2404	779	99.87
Eddoes	674	867	8	1533	666	98.81
Cassava	149		10	140	140	93.96
Yams	850	206	0	1056	850	100.00
Other Staples						
White rice	2032	2037	420	3649	1612	79.33
Parboiled Rice	26654		2334	24320	24320	91.24
Wheat	109330		9509	99821	99821	91.30
Corn	51254	1323	9	52568	51245	99.98
Other Carbohydrates						
Soya Flour	41			41	41	100.00
Peas and Beans						
Split Peas	4256		10	4246	4246	99.77
Pigeon Peas	577	1060	8	1629	569	98.61
Black eye peas	602		35	567	567	94.19
Red beans	924		43	881	881	95.35
Lentils	1811		1	1810	1810	99.94
Channa	2516			2516	2516	100.00

⁹ How Natural Resources Affect Economic Development Richard M. Auty. Available at http://web.nps.navy.mil/~relooney/DPR_21.pdf

Vegetables						
Tomatoes	2667	3840	205	6302	2462	92.31
Cabbage	1210	2160	134	3236	1076	88.93
Lettuce	356	960	3	1313	353	99.16
Carrots	3899		3	3896	3896	99.92
Fruits						
Pineapple	446	900		1346	446	100.00
Citrus	4	5800		5804	4	100.00
Paw-Paw		1200		1200	0	-
Spices						
Ginger	265		7	258	258	97.36
Turmeric	213		0	213	213	100.00
Garlic	2972		6	2966	2966	99.80
Onions	6055		25	6030	6030	99.59
Juices						
Concentrated orange Juice	3306		506	2800	2800	84.69
Concentrated Pineapple Juice	367		68	299	299	81.47
Concentrated Passion Fruit Juice	157		1	156	156	99.36
Meats						
Mutton	1264		1	1263	1263	99.92
Goat meat	817		2	815	815	99.76
Source: Ministry of Agriculture (2008)						

Clearly a demand gap exists for the majority of the agricultural commodities consumed, indicating that the T&T economy is characterized by some degree of food insecurity in this regard. The Table above also shows that a significant amount of the agricultural commodities are imported. No doubt this situation has been precipitated in part by the fact that food imports have become accessible with rising incomes (see Table X below). In this regard, the Table below shows some meaningful correlations between food imports, food consumption, and oil prices. Notice the high degree of correlation between food imports, net food imports and oil prices, as well as food consumption and oil prices¹⁰. The 92% correlation between food imports and oil prices indicates that in general there is a strong tendency for food imports to rise with rising oil prices. A similar relationship exists with food imports, and oil prices and net food imports and the oil price. A correlation index, between oil price and food imports of 77% indicates that as oil prices increase T&T tends to import more food. Food consumption is also strongly (78%) positively correlated with oil price¹¹. However and not surprisingly, food production is negatively correlated with the price of oil (-13% in the period 1981-2008 and -76% in the period 1994-2008). The impression from these data is clear; as oil prices rise, food imports increase to facilitate growing food consumption amidst declining food production.

¹⁰ Food consumption is calculated as domestic food production + food imports – food exports

¹¹ Domestic Agriculture + Food Imports – Food Exports

Useful correlations 1981-2008	
Food Imports and oil price	92%
Net Food imports and oil price	77%
Food consumption and oil price	78%
Food production and oil price	-0.13%
1981-1993	
Food Imports and oil price	8%
Net Food imports and oil price	75%
Food consumption and oil price	75%
Food production and oil price	-46%
1994-2008	
Food Imports and oil price	95%
Net Food imports and oil price	73%
Food consumption and oil price	75%
Food production and oil price	-76%

Food availability is also associated with the concepts of hunger, nutrition, and energy consumption. For the T&T case, the incidence of undernourishment stood at 10% for the period 2002-2004. The Table below shows T&T trends in undernourishment for various periods of time.

Prevalence of undernourishment in the Total population of T&T	
1969-1971	16
1979-1981	6
1990-1992	13
1995-1997	15
2001-2003	11
2002-2004	10
Lovendal, Jokobsen and Jacque (2007)	

The prevalence of undernourishment is directly linked to food availability (WHO 2005)¹². Note that the improvement in the prevalence of undernourishment since the mid 1990s was no doubt linked to the increase in the food supply via the increase in food imports (by over 70% between 1981 and 2007) and marginal increases of the size of the domestic agricultural sub sector (18% between 1981 and 2008). Other factors such as the quality and delivery of health care and nutrition education also affect the extent of undernourishment in an economy (WHO 2005)¹³

Core Issue 2: Accessibility

The UN (2009) has defined food access as it relates to food security as *access by individuals to adequate resources – entitlements -- for acquiring appropriate foods for a nutritious diet*. The accessibility dimension of food security therefore does not explicitly imply that all will have

¹² <http://www.euro.who.int/document/E86220.pdf>

¹³ The health care system in T&T has been plagued with inefficiencies and shortcomings. In particular health care delivery in T&T is decentralized and often duplicative in its operations. This decentralization of the health care system began in 1994. Since then all health care indices have begun to worsen. Critics argue that the current system is too ‘top heavy’ such that prior to 1994 under the ministry system there were two senior managing officials. Under the current RHA system there are at least 40 such officials for each region. The system is also rampant with corruption, especially given the weak monitoring framework. No doubt this situation provides “text-book” evidence of the resource curse. (This is the finding of a study conducted by a Senior Cardiologist in partial fulfillment of his PhD, submitted to UWI 2010).

access to food, but rather that households have the resources that enable them to obtain the appropriate kind of food for a nutritious diet. Accessibility implies that households have *entitlements* that can enable food production through agricultural activity or resources that can enable purchase of food on the market.

Entitlements in this context as defined by Sen (1981), refers to the *ability of people to command commodities by legal means available to society such as production, trade, exchange, transfer or any other mode, which is legally permissible and prevailing among the members of a society*. In a later publication Dre'ze and Sen (1989) noted that a person's entitlements at any point in time comprises of what he or she owned initially plus what was acquired through exchange.

Access to food is inextricably linked to a households' purchasing power which is dependent on income, as well as the level of food prices. The **Table** below shows the trends in the average income of households over the period 1995 to 2008. Average income increased from TT\$1800 to TT\$4,283, an increase of 137%, over this time period. Real per capita income has increased by 118%. Note however the trends in the real value of incomes for skilled and unskilled groups of labor¹⁴. For unskilled people real income levels worsened. For skilled persons who generally have a higher level of income, real income was calculated relative to the retail price index whilst for unskilled persons, their real income level was calculated using the food price index, given that food would account for the largest proportion of their expenditure¹⁵.

	Average incomes (TT\$) in T&T 1991-2008	Real Per Capita GDP	RPI (2000 =100)	Food price index (2000=100)	Real Average Income of Skilled workers	Real average income of unskilled workers
1995	1800	31732.62	82.55	35.40	4,321.06	3,954.64
1996	1800	32793.57	85.29	56.07	4,455.21	2,645.06
1997	1 940	33507.52	88.41	74.93	4,461.17	2,107.19
1998	2 198	35945.32	93.36	86.03	4,759.10	1,769.14
1999	2 194	37364.98	96.56	93.82	4,596.04	1,831.08
2000	2 335	39499.25	100.00	100.00	4,742.00	1,852.00
2001	2 409	40961.68	105.53	114.27	4,307.65	1,810.67
2002	2 670	44086.82	109.91	125.92	4,686.45	1,626.37
2003	2 962	50283.83	114.10	143.26	4,714.22	1,839.28
2004	2 944	54021.06	118.35	161.62	4,924.51	1,514.62
2005	3 107	57117.90	126.50	198.55	4,740.68	1,266.20
2006	3 335	63859.07	137.03	244.82	4,685.12	1,136.78
2007	3 789	67137.93	147.84	287.42	4,951.36	1,393.80
2008	4 283	69180.14	165.66	361.88	4,831.02	1,086.00
% change 1995-2008	137.94	118.01			11.80	(72.54)

¹⁴ Based on CSO, CSSP data skilled persons are legislators, senior officials and managers, professionals, technicians and associate professionals. Unskilled persons comprise clerks, service workers, agriculture, forestry and fishery workers, craft workers, plant and machine operators and assemblers and elementary occupation workers.

¹⁵ An article published by Medical News Today on Dec 3 2008, noted that *Poor people spend 50 to 70 percent of their income on food and have little capacity to adapt as prices rise and wages for unskilled labor fail to adjust accordingly*. <http://www.medicalnewstoday.com/articles/131501.php>

The **Table** shows unskilled workers experienced a fall in their real income or the purchasing power of income of 72%. In 2008, some 76% of the labor force, by the defined measure, was regarded as being unskilled. The implication of this is that food accessibility for unskilled workers is declining. The situation is such that a large proportion of the labor force is experiencing falling real income and as a consequence their access to food is being compromised.

Note the trends in the food price index. Since 1995, the food price index has progressively and persistently increased, alongside and in tandem with the price of oil¹⁶. The correlation between the price of oil and the food price index is 91% for the period 1995 to 2008. Rising food prices erode the purchasing capacity of income and can even result in a situation where real income actually falls as shown above¹⁷. In this type of environment food security for lower income groups can be compromised.

Fogel (1991) showed that throughout history it was only the privileged in society who were able to escape from the threat of famine, however, in recent times through concerted and collective interventions entire societies are beginning to achieve food security. This is being done through several modalities including government intervention. In this regard, Dre'ze and Sen (1989) noted that a person's entitlements need not consist of assets over which they have full ownership rights. The authors indicated that often times the public sector provides the right to use some commodities without owning them. This includes transfers or public goods. Some of the transfers relating particularly to enabling and achieving food security of the most disadvantaged groups in the T&T economy include, the Food Card system¹⁸ and the School Feeding¹⁹ program.

Although government transfers and subsidies may help to improve short run accessibility to food, one has to be careful about enhancing moral hazard consumption in an environment which is unsustainable. The **Table** below shows that as a proportion of total government expenditure, transfers and subsidies have increased from 26% in 1981 to 52% by 2008. Note also the trends in the sustainability budget index (SBI). The SBI is the ratio of government spending to government (non mineral) revenue. The rationale behind the construction of such an index is that sustainable development especially in economies which are dependent on non renewable resources requires that resource rents be reinvested in other reproducible assets in order to offset depletion of the natural capital stock. The index serves as a monitor for the government and other policy makers as to whether mineral rents are being reinvested. An SBI value less than unity implies that resource rents are being reinvested, whilst a value in excess of unity implies that resource wealth is being *liquidated* for current consumption a practice which is unsustainable in the long run. The Table below shows the sustainable budget index for the T&T economy over the period 1981 to 2009. Note that for the entire period the index record values in excess of one.

¹⁶ The T&T petroleum sector experienced a boom on account of the rising price of oil. The resource movement and spending effects associated with the Dutch Disease compound to drive domestic prices upward the consequence of which is an appreciation of the real exchange rate.

¹⁷ Real income = Income / price level. This is reflective of the purchasing capacity of income.

¹⁸ This program gives a grant of TT\$700 a month to needy families for the purchase of a standard basket of grocery items.

¹⁹ This program provides breakfast and lunch meals to selected students at the primary and secondary school levels. This program is geared towards meeting the nutritional needs of the nation's students who come from disadvantaged homes.

	Sustainable Budget Index (GS/ GR)	Oil price (US\$) per barrel	Transfers and Subsidies as % of Total Expenditure	Reserve to production ratio of crude oil
1981	1.47	32.5	26.2	8.3
1982	1.37	33.5	37.6	9.8
1983	1.62	29.3	46.8	9.3
1984	1.66	28.5	42.1	9.2
1985	1.56	28	42.0	9.5
1986	1.59	15	38.1	9.1
1987	1.72	17.3	44.1	9.3
1988	1.63	17	31.6	9.5
1989	1.75	19.6	37.0	9.8
1990	1.69	24.1	34.0	9.5
1991	1.51	21.6	31.5	9.4
1992	1.47	20.6	34.1	9.5
1993	1.32	18.5	28.9	10.9
1994	1.27	17.1	29.1	10.4
1995	1.32	18.4	29.4	11.6
1996	1.41	20.2	32.9	11.8
1997	1.24	20.4	32.0	11.9
1998	1.18	14.4	32.6	13.5
1999	1.38	19.2	35.7	15.1
2000	1.34	30.2	32.0	16.4
2001	1.30	28.6	35.4	19.9
2002	1.26	25.9	36.3	19.8
2003	1.44	31.7	37.7	15.4
2004	1.42	41.5	41.4	13.8
2005	1.43	56.5	49.5	11.4
2006	1.54	66	55.8	11.5
2007	1.40	72.3	56.0	
2008	1.32	99.6	57.4	
2009	1.7	61.7	57.0	

Source Central Bank of Trinidad and Tobago

The correlation between the SBI and transfers and subsidies as a proportion of total government expenditure over the period 1981 to 1993 is 50% and over the period 1994 to 2008 the value is 55%. These correlations are not trivial. Altogether the correlations indicate that transfers and subsidies contribute to the long run unsustainability of government spending. The corresponding correlations between the SBI and the reserve to production ratio are, -60% for the period 1981 to 2008, -34% for the period 1981 to 1993 and -22% for the period 1994 to 2008. Additionally note that the correlation between the SBI and the oil price is 45% between 1994 and 2008. This provides some evidence that oil funds are fueling government spending, a practice which is characteristic of oil dependent economies. Additionally, as Alayli (2005) notes because government spending is tied to oil funds it often leads to fiscal indiscipline²⁰. Hosein and Tewarie (2010) notes that in resource rich economies there is the tendency for government spending to be procyclical because of the influence of interest groups and other forms of ‘please spending’ by

²⁰ Resource Rich Countries and Weak Institutions: The Resource Curse Effect By Mohammed Ali Alayli. Available at <http://are.berkeley.edu/>

the government. It should be noted though, that this also provides evidence of the workings of the resource curse in T&T.

Additionally, improving food security by increasing government spending on transfers and subsidies is not consistent with the Hartwick logic. The Hartwick rule states that consumption levels can remain constant or even increase alongside declining natural resource stocks if the rents from these resources are invested into reproducible capital (Hartwick 1975). Transfers and subsidies are not considered reproducible capital in this regard. Altogether then, whilst per capita GDP may have increased food accessibility may not have increased for all and where it has been buoyed by government transfers it may not be sustainable especially in an environment of declining reserves.

Core Issue 3: Utilization²¹

Food security does not, however, simply imply that an adequate amount of food is consumed but also includes the condition that what is consumed can effectively maintain an acceptable nutritional status and allow for a healthy and active lifestyle. Food security is therefore also linked to the concept of utilization. Effective utilization of food requires that an individual's body be healthy enough to use up the energy and nutrients from the food consumed. Being in 'good health' therefore, is a condition which is achieved through access to appropriate health care services, living in a safe sanitary environment, access to clean water and as it relates especially to children, and that they are provided with the right kind of care. This dimension of food security is therefore concerned with factors underlying the necessary conditions to maintain good health. In fact as UN (2009) notes the *utilization of food through adequate diet, clean water, sanitation and health care* enables an individual to *reach a state of nutritional well-being where all physiological needs are met*.

In a resource curse context the argument can be made that the utilization dimension of food security can be compromised if institutions are weakened due to corruption, red tape, bureaucracy and foot dragging (Carter 2007)²². These conditions may result in poor delivery of services such as primary health care, primary education, information dissemination and public utilities; factors which are directly linked to *utilization*.

In particular Transparency International (2009) has noted that corruption may hinder and even in some cases violate the right to an adequate standard of living, access to safe healthy and sanitary living conditions, as well as the right to housing. Transparency International goes on to note, in respect to healthcare that, *the right to health includes healthcare, but also the underlying determinants of health, such as safe drinking water, adequate sanitation, adequate supply of safe food, nutrition, housing, occupational health, environmental health and access to health-related information. Another core component of the right has been identified, which the state must guarantee under all circumstances regardless of its available resources: access to maternal and child healthcare, including family planning, immunization against the major infectious diseases, appropriate treatment of common diseases and injuries, essential drugs, adequate supply of safe water and basic sanitation, and freedom from serious environmental health threats.....In*

²¹ The utilization dimension of food security is concerned with the conditions that underpin nutrition, health and well being. These conditions may be adversely affected in a resource curse context through corruption and policy neglect

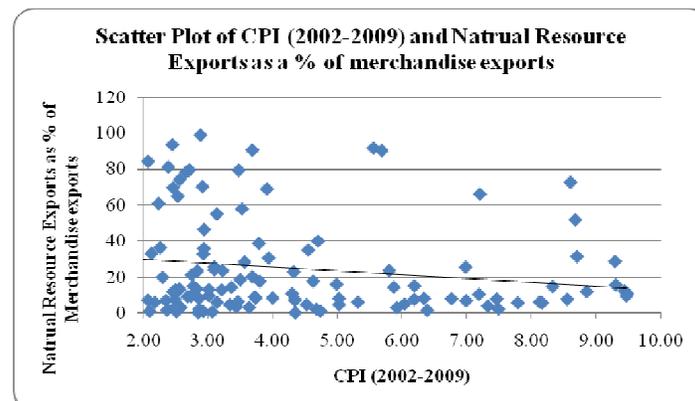
²² Carter (2007) Cursed by Oil? Institutions and Environmental Impacts in Alberta's Tar Sands. www.cpsa-acsp.ca/papers-2007/Carter.pdf

general terms, corruption in the health sector occurs in three main forms: in management of financial resources (budget allocation, etc.); in the distribution of medical supplies (purchasing, marketing); and in the relationships of health workers with patients.(page 69).

The World Bank has compiled a list of indicators, known as the world governance indicators, which speak directly to the issue of corruption. The figures below illustrate the degree of correlation between the worldwide governance indicators (WGI)²³ and the size of the natural resource sector²⁴.

The indicators include a measure for government effectiveness, regulatory quality and the control of corruption. The indicator for Government effectiveness *measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.* Regulatory quality *measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.* The indicator for control of corruption *measures the extent to which public power is exercised for private gain, including petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.*

The scatter plot below illustrates that for all economies as mineral exports as a percentage of merchandise exports increases, there is a tendency for the CPI to decline²⁵. This provides some suggestion that mineral rich economies tend to be more corrupt than other economies.

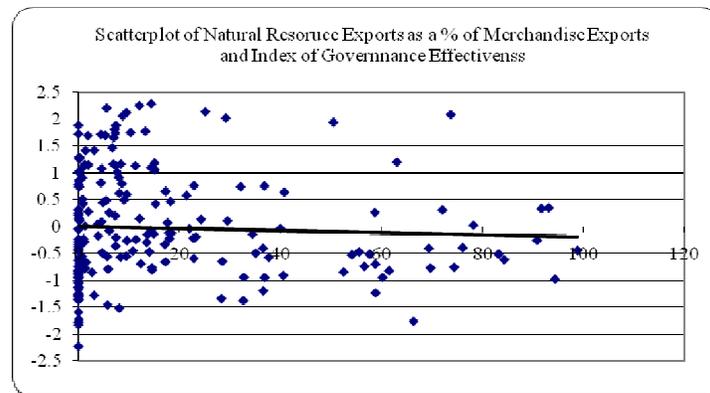


²³ The WGI reports aggregative as well as country specific governance indices for some 212 countries. WGI includes six indices, these are; Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law. Scores are measured on a scale of -2.5 to 2.5. Higher values correspond to better governance. **Voice and accountability** *measures the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.* **Political stability and absence of violence** *measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.* **Rule of law** *measures the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence*

²⁴ The size of the natural resource sector is measured as the sum of fuel and ores exports as a % of merchandise trade.

²⁵ The range of values that the index can take is between 1 and 10. Higher CPI values imply less perceived corruption. http://en.wikipedia.org/wiki/Corruption_Perceptions_Index

Resource rich economies, not surprisingly are also associated with governance problems (Torvik 2007). Consider the figure below. Specifically, and as the scatter plot below helps to show, there is a negative correlation between natural resource exports as a percentage of merchandise exports and the governance effectiveness indicators.



The Table below summarizes the T&T situation. It provides data which helps to illustrate that since 2000 government effectiveness in T&T has declined, since 1996 regulatory quality has declined and so to the control of corruption. Note that the CPI for T&T has declined indicating that there has been an increase in perceived corruption.

	Government Effectiveness	Regulatory Quality	Control of Corruption	CPI
1996	0	0.73	0.87	
1998	-0.04	0.69	0.31	
2000	0.43	0.67	0.14	
2002	0.33	0.73	-0.08	4.9
2003	0.51	0.73	0.05	4.6
2004	0.42	0.68	0.02	4.2
2005	0.29	0.64	0	3.8
2006	0.28	0.7	-0.18	3.2
2007	0.36	0.68	-0.21	3.4
2008	0.3	0.62	-0.17	3.6

Source World Bank Governance Indicators

Altogether then effective utilization of food may be affected. Some preliminary information in this regard is provided in the Table below for Mayaro and Point Fortin, two segments of the T&T economy with a high density of petroleum based economic activity. **Should compare to the rest of the economy**

Problems or Clinical Impressions Observed on First Visit by Year									
NARIVA/MAYARO									
Problem	2000	2001	2002	2003	2004	2005	2006	2007	2008
Diabetes	557	135	758	914	1006				
Hypertension	684	171	722	896	1119				
Arthritis	216	91	35	53	107				
Respiratory Disease	1036	426	83	155	176				

Other	5863	3001	1148	1281	1475				
Total	14357	4582	2953	3488	4149				

Source : County Medical Officers of Health Victoria & Nariva/Mayaro

At the national level also, note that there has been a worsening of several of the key health and wellness indicators. The general fertility rate has declined and so too the crude birth rate. Infant mortality, prenatal mortality and neonatal mortality have increased.

National Health Indicators for Trinidad and Tobago									
	General Fertility Rate	Crude Birth Rate	Crude Death Rate	Still Birth Rate	Infant Mortality Rate	Maternal Death Rate	Perinatal Mortality Rate	Neonatal Mortality Rate	Postnatal Mortality Rate
1990	77.1	19.7	6.7	13.1	12.7	54.3	20.1	9	3.7
1995	56.3	15.3	7.2	13.8	17.1	67.5	24.5	13.9	3.3
2000	51.8	14.4	7.5	12.1	21.1	55.1	26.3	17.1	4
2001	n.a	14.3	7.7	13.6	18.5	38.7	25.6	15	3.5
2002	n.a	13.3	7.7	15.9	24.2	29.4	29.8	20.2	4
2003	n.a	14	8	13.1	24	27.8	27.2	20.4	3.6
2004	n.a	13.4	7.6	14	16.5	52.2	23.2	13.4	3.0
2005									
2006									
2007									
2008									

Sources: CSO Population and Vital Statistics

These trends do reflect the extent of inefficiencies of the local health care service, alluded to above. These trends directly impact on the well being as well as the quality of life of people. These factors impact on the extent to which the body can effectively utilize food for energy and survival.

If left unchecked, this situation can snowball into a series of negative externalities. Achieving food security would require a combined effort from various facets of the social and economic fabric of the T&T economy.

Core Issue 4: Stabilization

The last dimension of food security is stability or vulnerability, and this focuses on the factors that may threaten an individual, household or a nation's food security. The UN (2009) notes that *to be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access as a consequence of sudden shocks, such as economic or climatic crises, or events such as agricultural seasons.* In this regard the UN (2009) noted that stability is critical to both food availability and food access.

At the macroeconomic level political stability is one factor that can lead to unrest and hence destabilize a country's access to food supplies²⁶. The Table below shows the trends in the WGI's,

²⁶ On Friday July 27, 1990, 114 members of the Jamaat al Muslimeen, led by Yasin Abu Bakr and Bilaal Abdullah attempted to stage a coup d'état against the government of Trinidad and Tobago. Looting ran rampant and as a consequence certain food stuff became scarce. http://en.wikipedia.org/wiki/Jamaat_al_Muslimeen_coup_attempt .Another keen example is that of Haiti. A

voice and accountability, political stability, and rule of law indices for the T&T economy. Note that since 1996 each of these indices have declined indicating a relative worsening of each dimension. These trends are consistent with the literature on the resource curse and if left unchecked can result in socio political unrest, which can ultimately affect the availability and access to food²⁷.

	Voice and Accountability	Political Stability	Rule of Law
1996	0.81	0.44	0.52
1998	0.81	0.43	0.37
2000	0.53	0.07	0.36
2002	0.53	-0.16	0.29
2003	0.61	-0.15	0.13
2004	0.59	-0.01	-0.08
2005	0.6	-0.07	-0.12
2006	0.65	-0.11	-0.29
2007	0.61	0.07	-0.2
2008	0.53	0.08	-0.25

Source: World Bank World Governance Indicators

Some of the other inherent and sector specific threats facing agriculture in Trinidad and Tobago have long been recognized in official documents and statements, but have not been addressed in a systematic and effective way. This policy neglect has no doubt been linked to the ‘foot dragging’ and reduced incentive for diversification associated with increases in resource wealth (Kozeibayeva 2008)²⁸. Additionally, the culture of familiarity with agriculture has been waning as more ‘lucrative’ opportunities emerge in the petroleum and even the services sector²⁹. With many young people leaving the agriculture sector, rehabilitation remains a challenge. No doubt

USA today 2004 report noted, *Haiti's prime minister warned Tuesday of an impending coup and appealed for international help to contend with a bloody uprising that has claimed 57 lives. But the United States and France expressed reluctance to send troops to put down the rebellion. Aristide militants and anti-government demonstrators now control roads leading to the Artibonite district, Haiti's breadbasket and home to 1 million people, and have cut supplies of food and fuel to northern Haiti.* http://www.usatoday.com/news/world/2004-02-17-haiti_x.htm

²⁷ Transparency International (2009) has noted that corruption can seriously undermine people’s right to food. In particular the UN (2001) has identified that corruption is one of the 7 main economic hindrances that prevent the realization of people’s right to food. As such the Declaration of the World Food Summit held in 1996 has specifically linked corruption to food insecurity. The report notes that corruption can redirect key resources away from social development and as a consequence directly and indirectly affect people’s right to food. Corruption can also affect food availability when the processes and practices associated with land use and tenure are biased. Corruption is also linked to food insecurity when food producers bribe officials for licenses and allow unsafe products to enter the market, when food distribution schemes are disrupted to divert supplies unto the black market for used personal gain. Political instability and unrest are also associated with food insecurity; such situations are often characterized by violence, weakened state institutions and a large informal economy all of which can compromise people’s right to food.

²⁸ Diversification of Economy as a way of Solving the Resource Curse in Kazakhstan by Leila Kozeibayeva. SPEA Honors Paper Series Vol. 2, No. 7. Available at http://www.indiana.edu/~speaweb/academics/pdfs/honors_vol.2_no.7.pdf

²⁹ In T&T the evidence of this is declining agricultural employment. Interviews with farmers indicated that labor is more attracted to the make work programmes such as CEPEP and URP rather than to farming.

this situation presents a critical problem in the context of food security. The ADB (2006) summed the issues compounding to affect the decline of the national agriculture sector. These relate to the fact that the agricultural industry itself is characterized by an inherently high level of risk, especially with regards to emerging diseases, weather and access to financing; all of which reflect the extent of policy neglect and lack of developmental investment assistance. In particular Inter-American Institute for Corporation on Agriculture (IICA) (2006), in a Review of the Agricultural Incentive Program for Agriculture, Forestry and Fisheries for Trinidad and Tobago, highlighted that the major constraining factors to the growth of the agricultural sector itself include the following, inadequate infrastructural base, poor access roads, inadequate water for agriculture, high cost of inputs, inadequate market facilities, inefficient market organization, praedial larceny, weak linkages between primary agriculture and agro-processing, pest and diseases, poor soil management practices and weak farmers lobby.

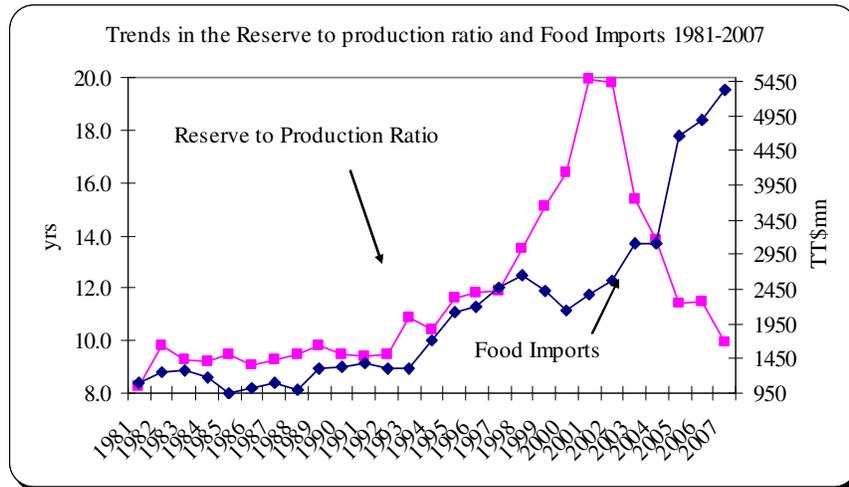
IICA (2006) argues that the combination of factors have served to cripple the agricultural sector and consequently resulted in its poor performance over the last decade. The report also noted that these problems could have been easily tackled if the appropriate policy and financial support were rendered. The state of the agricultural sector today is such that even domestic and export marketing is not well-organized³⁰. The Table below which summarizes information obtained from two agricultural censuses. Note that the number of persons facing marketing problems has increased in respect to most of the issues raised. Loss of market, low prices and lack of market infrastructure or facilities were some of the major problems being faced by farmers according to the 2004 census.

Number of Holders Encountering Marketing Problems		
	Agricultural Census 1982	Agricultural Census 2004
Transportation / Transportation Costs	5303	5010
Distribution	782	
Loss of Market / No Demand		4809
Storage	75	
Low Prices	2214	2696
Market Facilities / Lack of Market Space	2424	5706
Post Harvest Losses		10508
Competing Imports	195	
Access Roads	2105	
Labor	1748	
None		616
Market Information	22	
Other	10566	22

Clearly these problems reflect a lack of development funding and support and general policy neglect. This is typical in countries which experience the resource curse. According to Stevens (2003), *Natural non-renewable resources are often not consistently and prudently deployed for the establishment of competitive non-boom sectors. (page 4)*

³⁰ Farmers sell some produce at the farm gate as buyers contend with less than ideal conditions, such as poor roads to reach the farms. Some farmers sell at the roadsides, while others take their produce to local markets in Debe, Claxton Bay, Chaguarnas, San Fernando, Port of Spain and Macoya. Due to problems in handling, grading and transport, post-harvest losses are considerable. The infrastructure at most markets is inadequate resulting in considerable congestion on certain days. Cold storage and chill boxes for meat are lacking at most markets. Marketing remains a significant problem for agriculture in particular. Consider the data in the table below which indicate to some extent that structural problems exist within the sector itself thus necessitating immediate attention.

Another key point to note is that in T&T food availability is also influenced by imports. And as such, factors that can negatively affect the economy's ability to import can affect food availability in the long run. Consider the figure below which shows the trends in food imports and the reserve to production ratio for crude oil. Note that between 1994 and 2007, the period of the boom, the correlation between food imports and the reserve to production ratio is -37%. This correlation below indicates that there is a tendency for food imports to rise when the reserve to production ratio falls.



The reserve to production ratios reflects the long run prospects of the energy industry. A falling reserve to production ratio reflects a decline in the long term buoyancy of the energy sector and given that the energy sector dominates exports and hence earns a significant amount of foreign exchange, a decline in the reserve to production ratio would result in a decline in the capacity to import.

From the above analysis one can conclude that the T&T economy is facing a dilemma regarding its food security status in many regards and much more needs to be done to mitigate the negative trends identified.

Counterbalancing Food Insecurity in Trinidad and Tobago

Against the backdrop of an international food crisis, the T&T economy is facing threats to its food security position along each of the dimensions associated with the concept. Trinidad and Tobago's agriculture is in dire need of revival, but not only this, rather revival must be integrated with each of the associated dimensions of food security. This type of strategic planning is critical not only to improving the food security of T&T but also to ensure the long term survival of the agricultural sector. At the macroeconomic level the survival of the agricultural sector has implications for the long term economic growth of the economy as explained in a previous section. Its revival and hence survival is critical even against the burgeoning realities of declining oil prices, declining local oil production and even declining reserves³¹.

³¹ McKelvey Box discussion

To address the issue of food security policy makers need to individually address each of the associated dimensions of food security. Addressing capacity needs is critical to improving the knowledge on household food security and local diets. Additionally civil society should become more involved in the issues relating to food security and in particular to the utilization dimension, such as promoting primary health care, good child development practices and information dissemination, in order to strengthen community level action towards improving the overall food security status of the population.

As regards, food availability policy directives should be towards increasing the quantity of food produced. Notwithstanding that food availability can be increased via imports, this option is less attractive especially in an environment of volatile oil prices.

The production of food can be increased through several strategies. The establishment and formulation of a distinct policy towards self sufficiency in key agricultural commodities can incentivize the production of certain commodities. This kind of policy can also foster the viability of small farms, and result in sustainable farming. In a previous section some of the constraints to the domestic agricultural sector were listed. In this regard, therefore what needs to be done is to reduce and even eliminate the production constraints. This requires investment to reduce the impacts of the resource movement effect, high labor costs and land tenure issues in particular.

This high cost of labor has resulted in many agricultural plots remaining unfarmed. The consequence of which is that domestic agricultural prices have increased. Some attempts have been made to mitigate the rising price of food via the farmers' markets and large farms projects³² much still needs to be done especially as regards rebuilding the culture of familiarity with agriculture. Agriculture has been associated with the ills of slavery and colonial oppression in the T&T economy and as such people have over time moved away from the land. Parker (2006) eloquently explains, *the image of the black man bent double under a sack of newly picked tomatoes, or toiling through a prickly pineapple patch on "massa's" farm, dirty, sweating and enslaved, lingers in the modern psyche in relation to agricultural endeavours*³³ (pg 1).

A key to rebuilding the agricultural sector therefore, is the integration of the positive externality benefits of agriculture into the learning patterns of the potential crop of farmers for the next generation³⁴. A proven effective mode for introducing agriculture to the next generation is through the 4H program. *The 4H program is a worldwide youth program for young people between the ages of 9 years to 25 years who wish to learn the skills of home making and farming. The 4Hs stand for: Head, Heart, Hands and Health.* The aims of the 4-H program are to:

- Develop character, self-confidence and good leadership.

³² The farmers market project is aimed at allowing farmers to benefits from the full market price of their commodities through the elimination of middlemen. The Ministry of Agriculture has set up various Farmers' Market throughout the country which allows farmers to sell directly to consumers.

In 2005, 15 sites were chosen to establish the Large Farms. These large farms are being established to mitigate the relative decline of the agricultural sector. These farms would provide a wide range of root and vegetable crops and livestock to the domestic as well as the export market.

³³ Agriculture Facing Problems by Qunicy Parker (2006) This paper alludes to the key problems facing agriculture throughout the Caribbean. The author notes that agriculture is psychologically associated with slavery throughout the Caribbean. <http://www.jonesbahamas.com/?c=45&a=9645>

³⁴ This line of reasoning effectively builds on the Hartwick logic. The Hartwick rule essentially defines the amount of investment in physical capital that is necessary to exactly offset the decline in the stock of non-renewable resources. This investment is deemed necessary to ensure that the standard of living for future generations does not fall.

- Undertake agricultural and other projects which will be of value to them in a business like manner.
- Develop good citizens with a sense of civic pride and to be willing to work for the good of the community.
- Develop mutual respect between older and younger members of the community.
- Teach members how to enjoy life and the environment.

From the above analysis T&T's food insecurity threats may loom most predominantly in the availability dimension. Even so the decline in agricultural production has significantly impacted on this dimension of food security in particular. The 4H program is so designed to excite and encourage youths to engage in agriculture. This program can therefore be used to foster agricultural entrepreneurship in young people.

Investment in non traditional farming can also help to boost agricultural production and hence availability. A good example, is the emerging and increasing demand for fish, in particular Talapia. Talapia can be produced in a cost effective manner with few inputs. Notice that the total demand for Talapia imports increased by more than 300% between 1999 and 2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Whole frozen	27.3	27.8	38.7	40.7	49	57.3	56.5	60.8	46.9	49.6
Frozen fillets	5	5.2	7.4	12.3	23.2	36.2	55.6	74.4	100.6	100.6
Fresh fillets	5.3	7.5	10.2	14.2	18	19.5	22.7	23.1	26.2	29.2
TOTAL	37.6	40.5	56.3	67.2	90.2	112.9	134.9	158.3	173.8	179.5

Table taken from <http://ag.arizona.edu/azaqua/>

As noted above the resource movement effect has severely affected the availability of farm labor. To offset this constraint MNC's in the extractive sector can be lobbied to increase farmers' access to relevant agriculture physical capital. This can be done via the creation of equipment pools. This equipment can help with servicing and preparing the land. Equipment pools can be used to increase efficiency at the farm level and even bring idle plots into productive use. This can have the overall impact of increasing productivity at the farm level and hence improve long run food availability.

Training and education in agriculture is also critical to improving food production. Extension services are invaluable to the improvement in agricultural yields and the dissemination of information. In fact as the UN (1997) noted, extensions services are critical to addressing the local needs and concerns of farmers, with officers acting as a liaisons for small farmers at the ministry planning levels. Extension officers also provide continuous assessments of the impact of changes in policies at the farm level. This feedback type system is critical to ensure that policies are achieving its desired outcomes and that farmers are benefiting from interventions in their favor. Continual research and development coupled with food policy analysis can also improve long run food production.

Accessibility, as it relates to food security is essentially concerned with household income and market prices. To address the issue of accessibility, policies should be directed towards stabilizing food prices and enhancing incomes, especially agricultural incomes. As shown in a previous section the food price index is substantially higher than the average price index. Rising food prices severely compromises the accessibility to food of a large proportion of the labor force. What is necessary in this regard is for policy makers to establish a standard basket of basic

goods for which prices are kept at levels even the poorest household can afford. This may involve government intervention in terms of social security networks.

Interview industry specialists for policy

The utilization dimension of food security requires that the issue of nutrition, health and wellness be integrated. In this regard, the health and education sectors must work in tandem towards the improvement of the overall wellness of the population. Some of the key issues that must be addressed in this regard include pre and post natal care, breast feeding, child nutrition, communicable and lifestyle diseases.

The following matrix summarizes some of the necessary policy directions towards the mitigation of the issue of food insecurity.

Aims and Related Policy Directives towards Improving Food Security	
Dimension and Aim	Policy Directive
Food Availability	
Formulation of policy for self reliance in selected commodities	Food policy analysis would help in identifying which areas are most viable
Reduce and eliminate food production constraints	Expansion of extension staff Research into seed multiplication services and other ways of improving yields
Diversify food production	Food policy analysis supported by extension services
Monitor food imports to ensure stability	
Strengthen food reserve mechanisms	
Improve access to factors of production such as credit and land	Policies to improve land tenure for farmers
Accessibility	
Improve agricultural marketing processes	Strengthen agricultural institutions
Utilization and improved nutrition	
Increase access to safe water, sanitation and proper housing	Improve utilities infrastructure and employ Public Private Partnerships to improve availability to selected services
Promote health and education information dissemination process	Promotion of good health care practices such as breastfeeding

According to the Ministry of Planning and Development's (2008) Report, the Government of Trinidad and Tobago remains fully committed to the rejuvenation of the agricultural sector through its efforts to increase food production and productivity. The overall objective of which is to reduce food prices, as well as the food import bill, thus achieving some degree of food security and sustainability of the sector. The factors identified in the Vision 2020 Report as critical success factors for the establishment of a dynamic agricultural sector, include the development of agricultural infrastructure and the improvement in the efficiency of agricultural institutions, the promotion of the efficient functioning of agricultural product and consumer markets and the provision of training for farmers and persons desirous of engaging in agricultural activities.

In addition to this it is necessary to address the perceptions towards agriculture as a key towards its revival. This is critical because agriculture is often associated with rural development and the reduction of poverty. Agriculture has the potential to not only to increase rural incomes but also employment, savings and foreign exchange.