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The Volatility of the International Price and the Trinidad and Tobago Export Price of Cocoa

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Abstract

Cocoa prices are known to be volatile and this volatility has been known to affect the cocoa industry. This paper first examines the volatility of the international cocoa price and compares this volatility to the international price of coffee. The measure of volatility that is used is the moving standard deviation. The paper then measures the volatility of the export price of cocoa from Trinidad and Tobago and concludes by discussing how price volatility affects the marketing of tropical commodities like cocoa.

Keywords: Cocoa prices; price volatility

Introduction

Most commodity prices tend to exhibit long term upward trends. However, this paper is concerned with the tendency of commodity prices over shorter periods of time, to move upwards and downwards that is, the tendency of these prices to show short term variations. Recently, there has been increased concern about the observed volatility of world agricultural prices since over the period 2006-2009 there was first the 2006-2008 food price spike, followed thereafter by a sudden decline in some world food prices like grains and dairy products after the middle of 2008 (Huchet-Bourdon 2011).

Cocoa and coffee prices are known to be volatile. (Maurice and Davis 2011) This paper will explain the concept of price volatility and describe how it may be measured. Then, it will examine the recent volatility of the international cocoa price and compare this volatility to the international price of coffee. The paper will then measure the volatility of the export price of cocoa for Trinidad and Tobago. Finally, the paper will examine the effects of the volatility of cocoa prices.

Price Volatility

Commodity price volatility refers to the short term movement upwards and downwards of the price of a commodity. For example, it has been reported that world soybean prices rose from $237US/tonne in August 2003 to $413US/tonne in March 2004, an increase of 74%, only to fall back to $256 US/tonne over the next 24 months (Brown et al. 2008, 5).

One simple and popular measure of the volatility of a commodity price series is the sample standard deviation defined for an interval *i* (e.g. a quarter or 3 months) as:

$$\sigma_i = \sqrt{\frac{1}{N-1}\sum_{j=1}^{N}(P_{ij} - \overline{P_i})^2} \qquad \textit{Equation 1}$$

where N is the length of the interval i over which the volatility is being measured and P_{ij} is the price of the commodity in period j of interval i and $\overline{P_i}$ is the mean price of the commodity in the interval i.

$$\sigma_i = \sqrt{\frac{1}{2}\sum_{j=1}^{3}(P_{ij} - \overline{P_i})^2} \qquad \textit{Equation 2}$$

It is also useful to track the changes or fluctuations in the volatility of a commodity price over time. That is, it must be realized that price volatility itself fluctuates over the time (Pindyck 2004, 1029). For example, Brown et al. (2008, 1) report that commodity price volatility is increasing across a broad range of commodities, so that over the 40 years to 2008, there have been as many price shocks across a wide range of commodities, as in the 75 years preceding 1968. This can be accomplished by calculating and plotting the moving standard deviation, for example, a moving three period standard deviation of the commodity price. This was carried out in this study.

Volatility of International Cocoa and Coffee Prices

This section will present an analysis of the recent volatility of the international price of cocoa prices over the period January 2005 to July 2011, utilizing monthly averages of daily prices obtained from the International Cocoa Organization (ICCO). These prices are the daily average of the prices for cocoa futures contracts. For comparison, the volatility of the price of coffee for the same period was determined utilizing monthly averages of price data from the International Coffee Organization (ICO) Composite Price. As seen in Figure 1 over the period January 2005 to July 2011 there was a gradual rise in the price of cocoa from around $1500US/tonne to around $3000 US/tonne, ($19TT/tonne). However what is also evident from Figure 1 is that the international price of cocoa fluctuates and that this fluctuation appears to have increased markedly after January 2008.

As seen in Figure 2, over the period January 2005 to July 2011, there was also a gradual increase in the price of coffee, although there was a fairly steep increase in price, after April 2010. The price of coffee appears to have fluctuated a fair degree over the period, with a sharp increase in the fluctuation after April 2010.

Figure 3 plots the volatility of cocoa and coffee prices utilizing the three month period (quarterly) moving standard deviation for the period January 2005 to December 2007. In this Figure 3 it is seen that over the period, the international coffee prices were generally more volatile than the international cocoa prices although cocoa prices became more volatile after September 2007.

Figure 4 shows the volatility of cocoa and coffee prices from January 2008 to June 2011. Here, it can be seen that cocoa prices were generally more volatile than coffee prices over this later period, although coffee price become more volatile after Sept 2010. Moreover, Figures 3 and 4 show that cocoa prices were generally much more volatile since January 2008 and this volatility fluctuated more, over this period also.

Volatility of Fine or Flavour Cocoa Prices – The Case of the Export Price of Trinidad and Tobago's Cocoa

As is well known, fine or flavour cocoas receive premiums over the international price of cocoa. However, the level of these premiums also tends to fluctuate. Gammon (2010) in commenting on the premium for Jamaican cocoa states that the premiums for this fine or flavour cocoa have fallen recently, so that Jamaica now receives about £40-50 sterling or about 10% above the international or bulk price for cocoa. He suggests that Trinidad "can receive significantly more" of a premium price for its cocoa exports.

There is no future or terminal market for fine or flavour cocoa and the only price series that is available for cocoa in Trinidad and Tobago is the average annual export price calculated as the ratio of the value of export sales to the quantity of cocoa exported in metric tonnes. To assess the price volatility of Trinidad's fine or flavour cocoa therefore, a three year interval was chosen to calculate the triennial moving standard deviation as a measure of the volatility of these prices.

Figure 5 slots the annual export price of Trinidad cocoa in US$/tonne for the period 1966 to 2006. Here it is seen that there is an

overall upward trend to this price series, with the price moving from below $10/TT/Kg before 1990's to just above $30/TT/Kg by 2008. The average premium for Trinidad cocoa for the period 2005 to 2009 was approximately 200%, but this premium fell from about 247% in 2006 to 146% in 2009.

Figure 6 gives the triennial volatility of the export price of Trinidad cocoa for the period 1966 to 2009. Here it is seen that the annual prices were very volatile in the 1970's, but the volatility was lower in the period from the mid 1980's to around 2000, when the volatility of the prices again rose sharply.

Effects of Price Volatility

As indicated earlier, cocoa prices are said to display high volatility. Besides the traditional causes of volatility, associated with disease and fluctuating weather conditions in the major producing countries, an additional source of volatility is also associated with civil strife and wars associated with major African producers, For example Côte d'Ivoire and Nigeria. Speculation on future markets has also been said to lead to volatility of commodity prices including cocoa prices. (Brown et al. 2008, 9).

Some of the negative consequences of price volatility have been described by the major study of Brown et al. (2008, 10-11). The first problem identified is the difficulty of planning in an environment of high volatility. This difficulty of planning exists at all levels of the supply chain and also for governments relying on the revenues from major commodities for the funding of projects, aimed at fostering economic development. In addition, the fluctuations in the revenues to the state can also cause undesirable fluctuations in economic growth of economies highly dependent on revenues from exporting primary commodities, like cocoa.

In similar manner price volatility affects planning by farmers, especially where domestically, the full impacts of the price fluctuations are passed on to farmers. In these cases, commodity price volatility is reflected in household income volatility, affecting family resource management, especially the ability of households to sustain expenditures on food, education, health and on-farm investment.

The second area identified by Brown et al. (2008) as being affected by commodity price volatility is that of environmental management. In periods of high prices, it is argued, firms tend to exploit the environment negatively, by increasing production quickly, without regard to the need for resource sustainability. High prices therefore lead to extensive land cleaning and planting, while periods of low prices may lead to abandonment of resource conservation programme, both highs and lows thus leading to negative consequences for the environment.

In addition, there are adverse consequences of high price volatility on the marketing of commodities like cocoa, even where the marketing is coordinated by marketing boards that have been put in place to deal with issues like commodity price volatility. In the first instance, periods of high prices tend to make marketing agents take unnecessary risks, as Brown et al. (2008, p. 6) say, high prices tend to disguise the risks inherent in commodities with high price volatility. These risks include setting guaranteed or fixed prices too high, as well as starting programmes such as pension schemes, extension and other support to famers and investment in new plant and equipment. A return to low prices puts these marketing agencies in severe financial difficulties, from which some of them never emerge.

Another consequence of sporadic high prices for commodities like cocoa is that the rapid rises in prices attract very spectacular headlines in newspapers and nowadays online.[1] However, these spectacular headlines are not matched by similar ones when prices fall again, unless the falls are as dramatic as the rises, to ultra low levels, which is hardly ever the case. Hence, the

[1] For example: "Cocoa Highs hit Chocolate Makers". *BBC* news (25 April 2011), "Cocoa Prices Hit a 23-year High". *BBC* news (24 December 2008) and "The Bloody Conflict in Ivory Coast Sent Cocoa Prices to 34 year High". *BBC Report YouTube* (7 April 2011)

notion of high prices is left in the minds of farmers as producers through these news features, who may then demand unreasonably high prices from marketing boards, even long after prices have indeed fallen back to more "normal levels". Marketing boards are therefore pressed to increase "guaranteed" or "fixed" prices to producers in times of high prices, but then are not quite as able to reduce these prices, when international commodity prices fall, because of the anticipated negative supply response of farmers.

Conclusion

This paper compared the volatility of the international prices of cocoa and coffee by estimating and plotting the moving standard deviation of benchmark ICCO and ICO prices. It was seen that both prices are fairly volatile and that his volatility itself varied over the periods under consideration. The paper also examined the volatility of the annual export price obtained for Trinidad and Tobago's fine or flavour cocoa which price was also seen to be fairly volatile.

The paper then examined the effects of this high volatility of international commodity prices like cocoa caused by a number of factors including the more recent phenomenon of civil strife and wars in major cocoa producing countries, especially Côte d'Ivoire. One consequence of high volatility was seen to be that the high swings of prices generate problems for commodity marketing boards for several reasons. The first reason was the tendency for the boards to become engaged in non-sustainable investments and services. The second reason was the pressure exerted by producers to raise "fixed" or "guaranteed" prices offered to them, because of the optimism and buoyancy that is created by the euphoria and publicity of high and rising prices.

Brown et al. (2008, p. 8) suggests that high volatility of commodity prices should encourage those involved in community marketing *not* to ignore past experience and to always remember that inevitably the commodity price will *fall* and that all investment, price setting and risk taking in general must be done with this reality firmly established in minds of farmers and all marketing agents.

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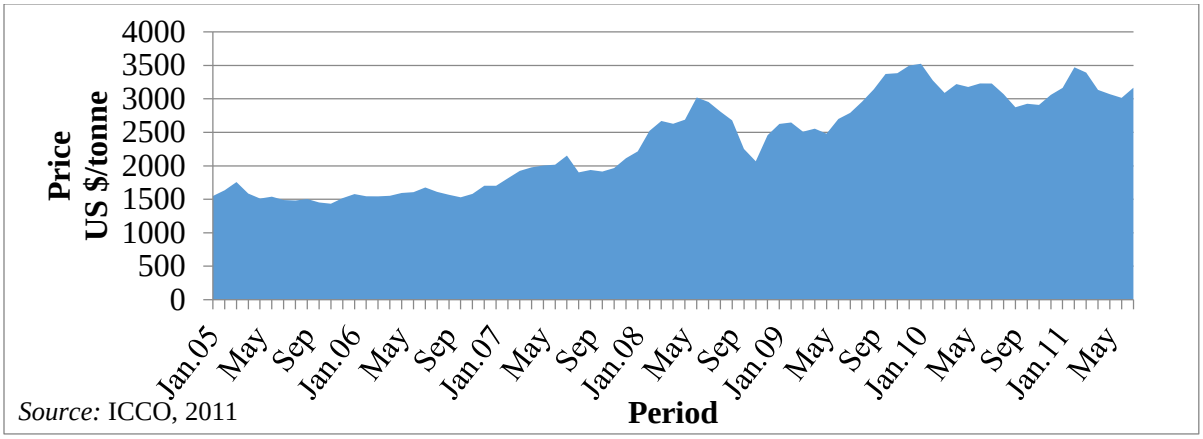


Figure 1: ICCO Monthly averages of Daily Cocoa Futures Prices (January 2005 – July 2011)

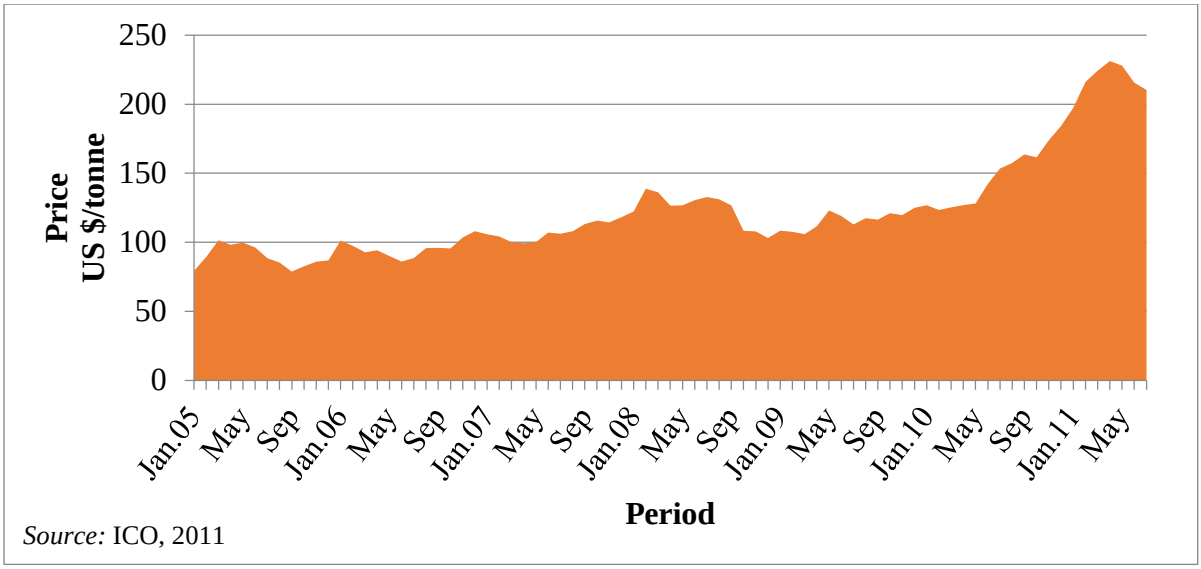


Figure 2: International Coffee Organization (ICO) Composite Price (January 2005–July 2011)

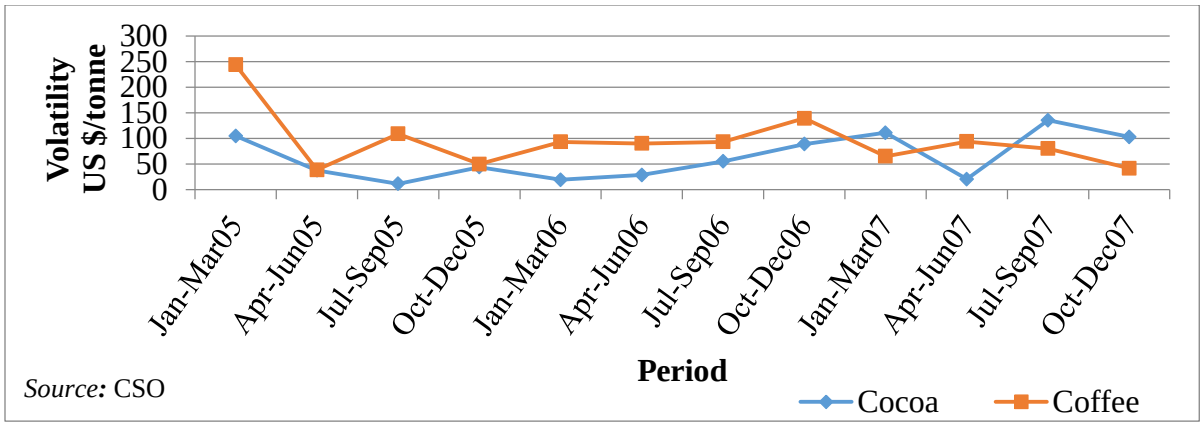


Figure 3: Volatility of International Cocoa and Coffee Prices January 2005-December 2007

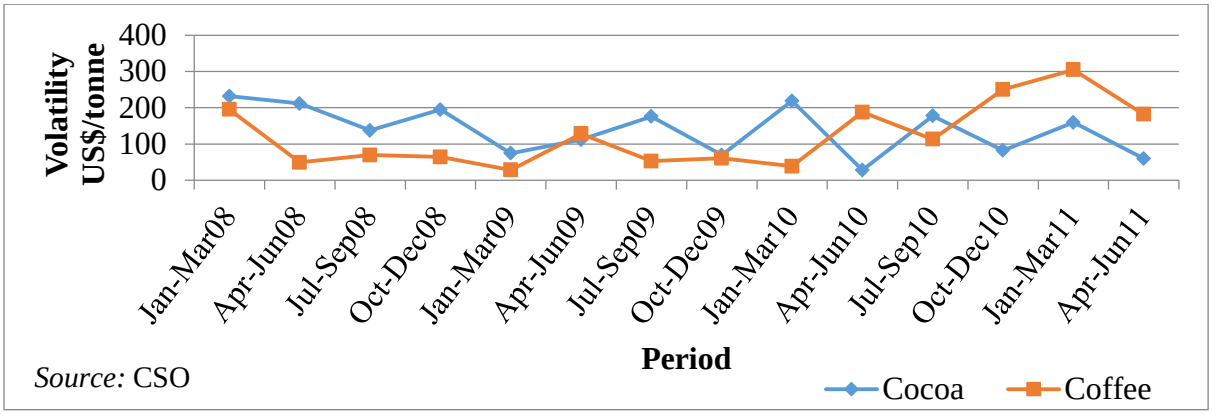


Figure 4: Volatility of International Cocoa and Coffee Prices January 2008-June 2011

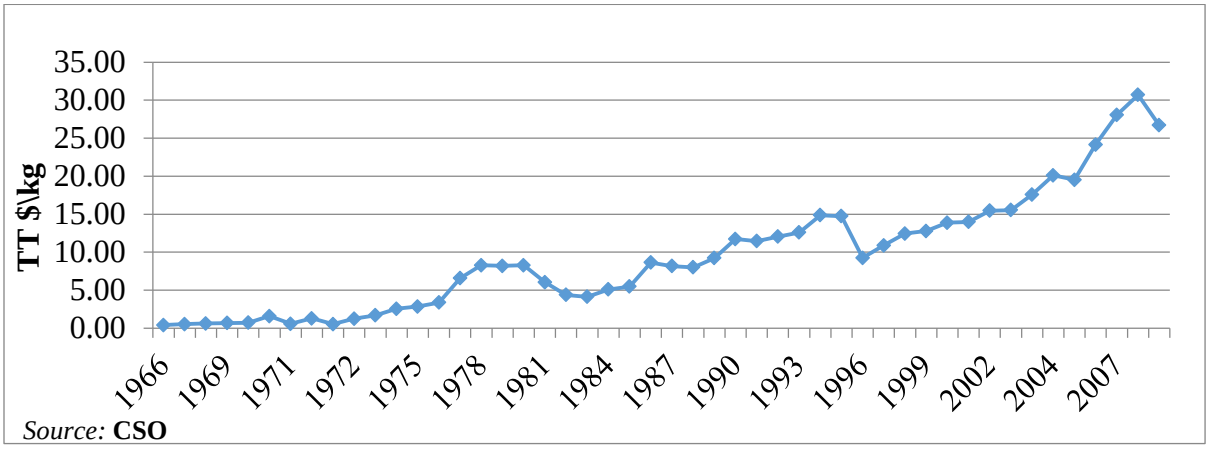
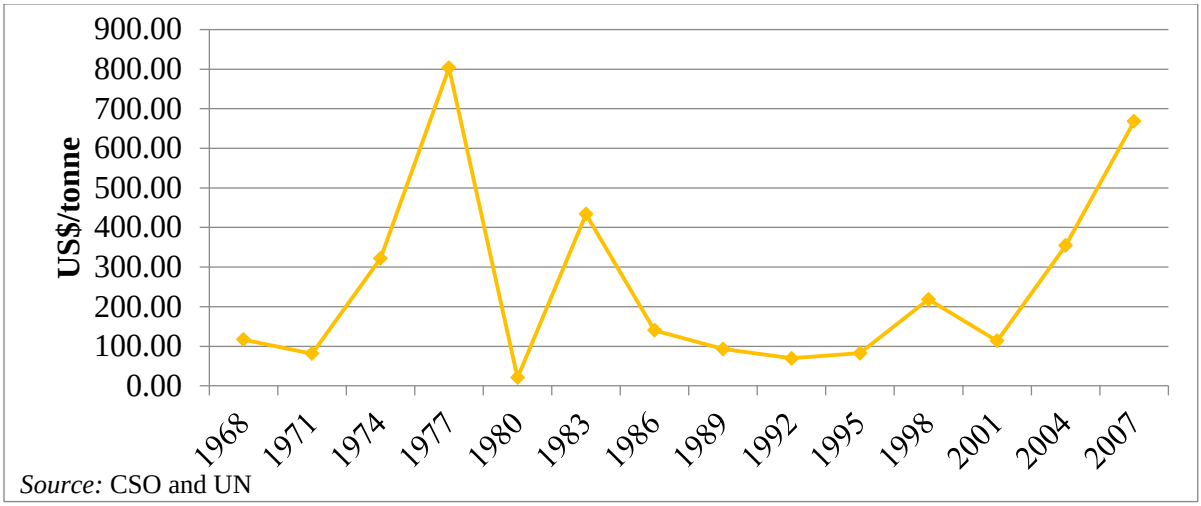


Figure 5: Average Annual Price of Cocoa Beans Exported from Trinidad and Tobago: 1966-2009



Source: CSO and UN

Figure 6: Triennial Volatility of the Export Price of Trinidad and Tobago Cocoa