

EXAMINING THE PRICE VOLATILITY ON AGRICULTURAL MARKETS – CHALLENGES AND IMPLICATIONS OF THE CURRENT ECONOMIC OUTLINE

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Abstract

Commodity prices have always been subject to a cyclical pattern of boom and recession phases around stable or decreasing trends on the long term. They are recognized in the economic analysis as experiencing a high degree of volatility and that their volatility also entails price volatility of manufactured goods. Accordingly, this aspect represented in the past and continues to be, even in a more pronounced degree, a reason for concern among all economic actors, governments, traders, producers and consumers. In order for the market participants to perceive and better manage volatility implications, it appears imperative to present a complex image of the factors that generate this instability. The current context, marked by numerous turbulences and by certain mutations in the behavior of economic actors on commodity and financial markets, confers new directions of analysis for the determinants of price fluctuations. The purpose of this paper is to highlight a number of new challenges arising in the analysis of agricultural commodity price volatility, with particular reference to the phenomenon of "financialization" of commodity markets and the intensification of the agricultural commodity and energy prices co-movements.

Keywords: price volatility, agricultural markets, financialization of commodity markets, speculation, price co-movements.

JEL Classification: Q02, Q11, Q40.

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1. Introduction

Commodity prices represent the ‘thermometer’ of the global economy (Terada and Shimizu, 2007) and a determining factor for the state of national economies and domestic prices of consumer goods. Their oscillations have a leading role in the emergence of price risk for the participants in economic life – from private to governmental level – through the key position these goods occupy in the business processes and macroeconomic relations worldwide. In such a context, the issue of commodity price volatility has always been a topical subject, but the recent economic context, marked by the turbulences in the world economy and the changes occurring in the price formation mechanisms have conferred it new connotations and new perspectives of analysis.

Commodity prices have always been subject to a cyclical pattern of boom and recession phases around stable or decreasing trends in the long term. They are recognized in the economic analysis as experiencing a high degree of volatility and that their volatility also entails price volatility of manufactured goods. Accordingly, this aspect represented in the past and continues to be, even in a more pronounced degree, a reason for concern among all economic actors, governments, traders, producers and consumers. Sharp fluctuations in prices may limit the ability of consumers or businesses whose production process involves the use of primary products to ensure their supply flows, as well as to control the costs of production factors involved in their activity. In macroeconomic terms, while price increases are beneficial for net exporters, contributing at improving their balance of payments, they are detrimental to net importing states, increasing the sums paid by them to bring on their domestic markets the desired goods. Moreover, regarding the developing countries, many of them are still in an advanced state of dependency of either the export or the import of commodities (Van der Ploeg and Poelhekke, 2007). Large price fluctuations can have a destabilizing effect on real exchange rates, creating serious problems in their economic environment and hampering efforts to reduce poverty.

Commodities whose demand has a reduced elasticity in relation to price (situation also specific to agricultural products) tend to be more volatile. There is a wide variety of factors that induce the volatility of world prices, such as: market fundamentals (demand and supply), inventory levels, changes in weather patterns and their consequences,

cycles within key markets, large governmental purchases, exchange rates fluctuations of currencies, energy price fluctuations (especially oil), trade policies and their degree of dissemination, agreements or geopolitical tensions, investments in production, changes in purchasing power, and so on, being impossible to achieve an exhaustive enumeration if all the connections and implications were to be considered.

In order for the market participants to perceive and better manage volatility implications, it appears imperative to present a complex image of the factors that generate this instability. The current context, marked by numerous turbulences and by certain mutations in the behavior of economic actors on commodity and financial markets, confers new directions of analysis for the determinants of price fluctuations. The purpose of this paper is to highlight a number of new challenges arising in the analysis of agricultural commodity price volatility, with particular reference to the phenomenon of “financialization” of commodity markets and the intensification of the agricultural commodity and energy prices co-movements. The remainder of this article is structured in the following manner. Section 2 highlights some behavioral characteristics of commodity prices, identified as a result of the investigation of literature. Section 3 examines new challenges in the analysis of commodity price volatility and Section 4 completes the paper by presenting the conclusions and their implications for participants in economic life.

2. Certain Behavioural Characteristics of Commodity Prices and Their Implications

Evidently, different commodity categories can register significant differences in terms of amplitude and frequency of their price movements. If prices of certain categories of goods experience relatively slight changes over long periods of time, others are characterized by more pronounced variations recorded sometimes over very small time intervals. Such dissimilarities in volatility may be due to differences in the organic nature of the goods or to differences in production, trading or consumption conditions. Moreover, even within the same commodity group, volatility varies from one historical period to another. The analysis of price variability throughout a year for some categories of goods will reflect the movements generated by all causes, incorporating general long-term trend of prices, seasonal, cyclical and accidental movements.

The investigation of economic literature allowed the identification of a number of features in commodity prices, each of them sustained by a consistent empirical support. The particularly remarkable features are the following:

- significant volatility (Reinhart and Wickham, 1994; Cashin and McDermott, 2002; etc).
- asymmetry – the tendency for low level periods to be deeper and longer than high level periods (Deaton and Laroque, 1992);
- general price co-movements for some uncorrelated commodities (Borensztein and Reinhart, 1994; Pindyck and Rotemberg, 1990; Cashin et al., 1999);
- general decreasing trend or long term cyclic behavior (Prebisch, 1950; Singer, 1950; Grilli and Yang, 1988; etc).

All these features identified in commodity price behavior are unfavorable for the participants at the economic life. The high volatility causes uncertainty about the level of income and consumption, while asymmetry brings extended periods in which producers register low incomes. The downward trend, combined with the common price movement of uncorrelated products, imply the existence of weak long-term hope, even though production diversification strategies, to overcome these risks.

The empirical analyses on large data sets prompted some conclusions about the features of commodity prices and the transformations they undergone over time (Cashin and McDermott, 2002). Accordingly:

- I. Price volatility has increased over time. The first increases were noticed in the early twentieth century, and more recently since 1970. While volatility increase in the early 1900s was due to large amplitude price movements, the second was due to an increase in the frequency of large price fluctuations which, consequently, reduced the duration of large price cycles.
- II. Long-term trends in prices are overwhelmed by their volatility which makes short-term price movements unpredictable. In terms of both economic and statistical significance, price volatility dominates long-term trend.

Since 1950s, the major concerns of the economists on the subject of price behavior have focused around the newly launched Prebisch-Singer hypothesis (Prebisch, 1950; Singer, 1950) which stated that due to reduced income elasticity of commodity demand, as well as a higher growth of productivity for commodities compared to manufactured products, the price of commodities, compared to manufactured goods, would undergo a long-term decreasing trend. Concerns in this regard are justified by the fact that the veracity of this hypothesis provides a long-term unfavorable outlook for the commodity producing and exporting countries. Starting with the studies of Prebisch and Singer in 1950, empirical research (eg, Grilli and Yang, 1988) have demonstrated a downward trend in commodity prices. A very long-term analysis using price series for the period 1862–1999, indicated a downward trend of about one percent (1%) per year, in real terms, for commodity prices (Cashin and McDermott, 2002).

Long-term downward trend in prices constitutes a strategic problem that is likely to continue in the near future, but before efforts can be directed to combat it, producers must fight to survive short-term price fluctuations and their implications.

Thus, nowadays, concerns have been redirected towards a much more overwhelming aspect than the one identified by the Prebisch-Singer hypothesis, namely the intensification of price volatility. If in terms of long-term

decline in prices, empirical studies have revealed an average annual decrease by one percent, this process was not a smooth one, since sometimes price recorded changes up to 50 percent over one year (Cashin and McDermott, 2002), situation which was further aggravated in the context of the recent years.

Through the profound consequences involved in producers' income stability, in fiscal position of commodity export dependent states and in achieving macroeconomic stability, volatility represents a key feature of commodity prices. Thus, information about its nature and its triggering factors currently acquire a particular relevance in the context of risk and uncertainty analysis in which the economic actors operate, while the governmental fora involvement in its attenuation becomes an overriding issue in the context of the global turmoil in the current economic environment.

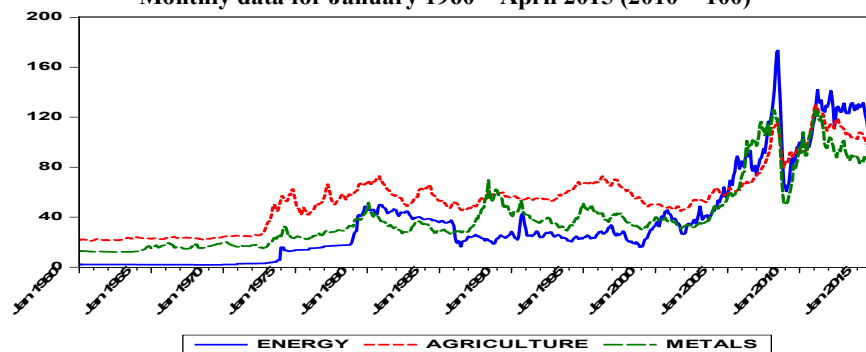
3. New Challenges in the Analysis of Agricultural Commodity Price Volatility

In the economic practice, addressing volatility occurs from two perspectives that measure either how much prices have changed over the last time interval, or how extensive are the changes expected for a future time horizon. Consequently, the most used measures of volatility are:

1. *Realized volatility*, based on price oscillations observed for a certain historical period, shows how unstable (volatile) the price of a particular asset has been in the past. This reflects therefore past price fluctuations and the effects of demand and supply determining factors.
2. *Implied volatility* illustrates market expectations on how volatile the price of a particular product is assumed to be in a future time horizon. Most times it is possible that the data underlying the calculation of historical volatility may no longer reflect current situations or those expected in the future regarding supply and demand. For this reason, the implied volatility tends to be more responsive to the current state of the market. Thus, implied volatility can be a useful technique for discovering traders' expectations about future price developments; however, considering the great turmoil that characterized markets in recent years, it may also reflect how wrong these expectations can be.

Price volatility has increased since the 1970s onwards, as only between 1972 and 1999 occurred as many major price changes that had taken place between 1899 and 1971 (Cashin and McDermott, 2002). Moreover, international commodity markets have undergone major turbulences in recent years, with prices reaching historical resonance peaks, just to collapse dramatically a few months later and very soon to resume their rise (Figure 1).

Figure no. 1 Evolution of price indices for the main commodity groups on the World market
Monthly data for January 1960 – April 2015 (2010 = 100)



Source: author's elaboration based on data released by World Bank (2015).

For example, in June 2008, agricultural commodity prices recorded values by 55 percent higher than in June of the previous year, increasing only over a three months period (between November 2007 and March 2008) by approximately 34 percent. The same product category, after reaching a high point in June 2008 would fall by December of the same year by more than 60 percentages (only from a month to the next – September / October decreasing by over 24 percent). From that low point reached in December 2008, the prices suddenly resumed a winding upward path, reaching in May 2010 a level by about 22 percentages higher. Similar oscillations (sometimes even of greater magnitude) occurred on the markets of other categories of commodities. In May 2007, international metal prices, following a winding path, reached a more than 128 percentages higher point than they had registered three years ago in May 2004. Subsequently, since March 2008 until the same month of 2009, they fell by 105 percent (decreasing by only 33 percent between September and October 2008). Then, from March 2009 to April 2010 they increased again by 80 percent. The price of oil and other fuels increased by about 150 percentage points from early 2007 to mid-2008, when it fell, in December 2008, just four months later (with monthly changes of up to 50 percent – September / October 2008) by about 171 percent. Subsequently they resumed their climbing from February 2009 to May 2010 by 80 percentage points (author's calculations based on the data published by the World Bank, 2015).

Certainly a volatility of this magnitude as the one experienced by the world prices in the recent years considerably widens the context of risk and uncertainty for the economic players, making production and operation planning extremely difficult on both short and long-term.

In order to create a framework for interpreting and eventually forecasting price fluctuations, the literature in the field has been investigated to identify the main determinants of volatility. Changes in global supply and demand continue to be the key elements in explaining the variability of prices on the medium and long intervals. These factors are joined by a number of systemic macroeconomic factors affecting commodity markets and influencing price volatility. An emerging factor in the macroeconomic category which contributed consistently at generating price turmoil in the recent years is the “financialization” of commodity markets, a relatively new phenomenon in commodity price formation on futures markets. This phenomenon expresses the increasing interest in commodity futures contracts not only as a way to hedge against price risk, but as an asset purchased for profit that can be used in traditional financial portfolio diversification. The reason for the expansion of this phenomenon was primarily that profits from commodity futures are negatively correlated with traditional financial assets such as stocks and bonds. This relationship indicates that investment in commodity futures contracts offer an attractive portfolio diversification because they reduce portfolio volatility in financial return. Moreover, comparisons between commodity futures returns and those of traditional financial assets, such as shares and bonds, indicate the first category as the most profitable, with a higher yield compared with traditional assets.

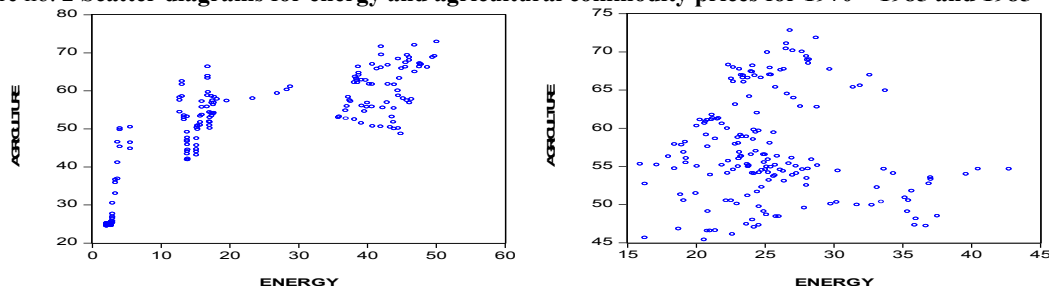
Speculative activities on commodity exchanges are one of the most blamed factors for price volatility. As a consequence of speculative activities in the market, prices react very quickly to new information and events, their reactions taking sometimes exaggerated proportions and causing volatility increases in very short time intervals (Trenca, Mihut and Pece, 2015). These phenomena hamper the economic agents to properly manage their futures positions that were opened in order to protect them against price risk.

However, speculation is a common practice in all commodity exchanges, constituting an essential element of commodity trade. Thus, even if volatility attracts a significant amount of speculative activities that can destabilize markets, the presence of speculators on derivatives markets is a prerequisite for achieving functional and efficient hedging activities, because speculators are those who take on themselves the risk initially held by hedgers.

Thus, it can be said that the actual impact on prices, on their formation mechanisms and on their volatility, through the phenomenon of “financialization” is determined by the diversification of participants with the entry of large global investors and not by traditional speculative practices. It is true that on markets on which are traded only small amounts of physical goods, the value of speculative transactions can create false trends and lead to higher prices for consumers. The arguments, both in favor (eg. Irwin and Sanders, 2010) and against (eg., Robles et al., 2009), speculative actions are ample, although the general evidence was inconclusive. While other factors and fundamental forces are at stake and must be taken into account, there is an overlap in time between increased volatility and rising open interest in commodity markets. While growing interests and influx of investments increase market liquidity, increased liquidity may in turn cause an increase in volatility.

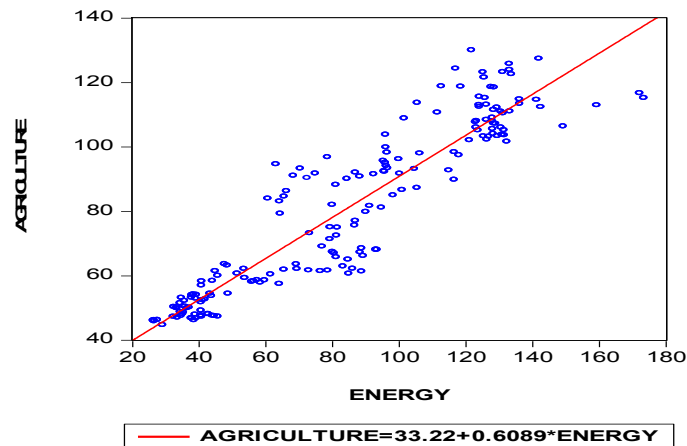
Another new element in the behavior of commodity prices – mainly manifested on agricultural markets – is represented by the highly correlated movements in prices of these products with the prices of energy and other commodities. The links between energy and agricultural markets before the advent of biofuels was manifested only in one direction: the oil and energy as agricultural inputs. The link between energy and agriculture raises questions about the transmission of volatility from the more volatile oil and energy markets towards the agricultural markets, in the absence of significant changes in market fundamentals. The intensity of this relationship is not yet established, although some empirical studies (eg. Du et al, 2009 or Tothova, 2011) found evidence of contagion between crude oil, corn and wheat markets, after the autumn of 2006, which they explained through the close interdependence between these markets determined by ethanol production. In order to illustrate this connection, especially intensified after 2000, Figure 2 and Figure 3 show the scatter diagrams for the periods 1970-1985 and 1985-2000, respectively 2000-2015 for energy and agricultural commodity prices.

Figure no. 2 Scatter diagrams for energy and agricultural commodity prices for 1970 – 1985 and 1985 – 2000



Source: author's elaboration based on data released by World Bank (2015).

Figure no. 3 Scatter diagrams for energy and agricultural commodity prices for 2000 – 2015



Source: author's elaboration based on data released by World Bank (2015).

Introducing an OLS line reveals a much stronger correlation for 2000–2015 between the energy and agricultural commodity prices, with an R-squared of 85.65%, at a 5% significance level.

4. Conclusive Remarks and Implications

In the recent years, an increased interaction between commodity and financial markets appears to have contributed significantly to increased price volatility. New actors and new commodity derivative instruments have reshaped the markets' behavior and price formation mechanisms within them, through open speculative positions, arbitrage, hedging behaviors and other types of transactions common to financial markets. In essence, the phenomenon of “financialization” of commodity markets has exacerbated the impact of other factors. Even if it appears quite difficult to separate the market fundamentals from financial market factors, and the theoretical and empirical analyses have revealed contradictory results, in the economic literature there is a general recognition that only the market fundamentals (supply and demand) cannot explain the price rises and slumps experienced lately in global markets. This issue raises questions about how commodities markets should be regulated so as to curb the influence of financial investors on volatility without undermining their role in the price formation process.

Although references are often made for situations where there is an ‘excessive volatility’, it is generally accepted that a certain degree of volatility is welcomed, and price volatility is a normal feature of the markets. Without price adjustments, the markets could not function under effective conditions. Volatility on commodity markets is not a uniform phenomenon. Although active players on the agricultural commodity markets consider its prices to be highly volatile, as compared to energy markets, volatility remains quite low. Energy prices have been historically more volatile than other commodity categories. Other markets such as metals, sometimes showed greater volatility than energy markets, but these episodes were short and transitory.

In an environment of increased volatility for long periods of time, problems in extracting real price signals from the plurality of erroneous messages may appear, situation that may generate an inefficient allocation of resources. The high degree of uncertainty limits opportunities for producers to access credit and tends to cause a focus towards production techniques with a low risk, thus disfavoring innovation and entrepreneurship (Jacks et al, 2009). Moreover, the more extensive and more unpredictable price changes are, even greater opportunities for substantial gains from speculative activities appear. Consequently, a volatile price environment can attract significant speculative activity, the entry of large players, which may thus initiate a vicious circle of price destabilization.

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