The Global Food Crisis: Supply and Demand Revisited

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Abstract: This study aims to show that the volatility in food prices between 2008 and 2011 cannot be explained merely by the market fundamentals of demand and supply. While global changes in demand and supply are bringing about radical changes to the food equation, evidence shows that market failure in the world grain market aggravated the problem. Excess liquidity, brought about by monetary growth policies after the subprime crises and financial meltdown in 2008, has stimulated speculation and hoarding. Strong incentives for financial operators to find better returns in places like the commodities market is attested by the six-fold increase in the number of ‘derivatives’ contracts made between 2002 and 2008. Furthermore, agriculture is one of the most heavily subsidized, protected, and distorted markets in the world. This is a key reason behind a decade long lack of progress in the Doha Round of the World Trade Organization (WTO). This study investigates the hypothesis that speculative activities are a major source of volatility in the agricultural commodities market and that this has significantly contributed to price inflation. It also explores Malta’s possible involvement in food commodity speculation, albeit on a small scale.

Keywords: food security, price hikes, speculation, financial derivatives, deregulation

Food commodity prices and the threat to food security

Agriculture has over the years experienced a decline as an industrial sector, particularly in the developed economies of Western Europe and North America. Government subsidies...
and improvements in technology, such as the genetic modification of crops, have induced an ever-increasing supply. These, coupled with low income and price elasticities of demand, have rendered cheaper the price of food. Indeed, between 1974 and 2005, food prices on world markets fell by as much as 75 per cent in real terms\(^1\) with the price of all the three basic cereal staples, rice, wheat, and maize (corn), experiencing a long-run decline of more than 1 per cent per annum over the past century.\(^2\)

Rather than food price inflation, the issues of concern in affluent countries centred on production surpluses, ecological and environmental degradation and sustainability, domestic and industrial wastage, water management, and health-related problems, such as obesity and heart disease. That is why the unexpected and extraordinary price hikes experienced in 2008 and again between 2010 and 2011 have created socio-economic shocks throughout the world. Wheat prices, along with those of rice, maize, oilseeds, and dairy products, all reached record peaks in nominal terms. *The Economist*’s estimated food-price index for 2007–08 was higher than at any time since it was created in 1845.\(^3\)

According to the Food and Agriculture Organization (FAO)\(^4\) and World Bank\(^5\) estimates, the number of people in extreme poverty rose between 130 to 150 million, with the total number of people living in hunger rising

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3. Ibid., 1.
to 963 million in 2008. Prices then fell sharply in the second half of 2008. But market tensions emerged again during 2010, and at least another 40 million people around the world were driven into extreme hunger and deprivation. By early 2011, fears emerged that a repeat of the 2008 crisis was underway. The FAO food price index, measured in nominal terms, reached an all-time high in February 2011 (Figure 1, below).

What is striking about the current situation is the existence of high prices and simultaneously, the high volatility of these prices. According to a High Level Panel of Experts report (HLPE 2011) on Food Security and Nutrition of the Committee on World Food Security:

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Source: World Bank

Figure 1: Food Price Index at current and constant terms US Dollar (2005=100) 1960–2011
What is new on international food markets is the existence and persistence of upward pressures that provoke simultaneously higher and more volatile prices. ...markets needed one of the worst depressions since World War II (with a growth rate of world output falling from +5.4 per cent in 2007 to +2.9 per cent in 2008 to - 0.5 percent in 2009) to get food prices down, and the fact that even with such a depression, food prices did not fall back to their pre-2006 levels. 8 

Of course, people in the Low Income Food Deficit Countries (LIFDCs) suffer the brunt of food price spikes 9 because as much as 80 per cent of their income is spent on food when compared to 10 to 15 per cent in rich developed countries. 10 Moreover, this renders the price elasticity of demand in poor countries to be much higher than in wealthier ones. 11

Figure 2 presents the average own price elasticity for various food subcategories calculated for 114 countries and ranked in relation to their 1996 per capita Gross Domestic Product (GDP). These were in turn categorized into three income groups: low, medium, and high 12.

Consumers in low-income countries respond more readily to price changes than in high-income countries, with price elasticity varying from (-)0.5 for cereals, a staple food, in the Democratic Republic of Congo to (-)0.063 for the USA. Clearly, this is another way of saying that ‘when prices rise, populations in poor countries eat less food’.\textsuperscript{13}

\textbf{Source:} Regmi et al. 2011

\textbf{Figure 2: Global food price elasticity in relation to income}

In a competitive market system, price variability is theoretically expected to generate maximum economic welfare by balancing out market variations in demand and supply and eliminating price disequilibria. However, price variability becomes problematic when it is large and unanticipated because the level of uncertainty that it creates increases risks for producers, traders, consumers, and governments. As stated in a joint policy report in preparation for the June 2011 meeting of the group of the 20 wealthiest nations (G20):

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\textsuperscript{13} HLPE 2011, 23.
Suffice it to say that price volatility becomes an issue for concern and for possible policy response when it induces risk averse behaviour that leads to inefficient investment decisions and when it creates problems that are beyond the capacity of producers, consumers or nations to cope.14

Scope and method

This paper focuses on the hypothesis that the global food crisis experienced in 2008 and again in 2010 through 2011 was directly correlated with speculation in the financial derivatives market. This hypothesis has not been supported by empirical evidence. Yet, many factors may explain the global food crisis and this paper investigates alternative explanations based on a literature search and official data published by international agencies, such as the International Monetary Fund, the World Bank, FAO, and the United Nations Conference on Trade and Development.

This study does not aim to provide a comprehensive answer to what are the determinants of a food crisis. Rather the objective is to contribute towards the ongoing debate and this should be of interest to students, researchers, policy-makers, and anyone who has an interest in current global issues.

One special aspect of this paper is an examination of the positive correlation between the high levels of imports in Malta carried out during the short period between 2007 and 2011, at a time of rising grain prices in the international market and food exports.

The study is limited by its dependence on data provided by official agencies. It could have benefited from quantitative and qualitative primary research which, owing to time restrictions, was not undertaken.

The dynamics of the international food crisis: Underlying causes

Free-market economic theory is based on the concept that consumer demand and the supply of firms are closely interrelated and that this relationship determines market prices. Any change in any one or more variables that influence demand such as a change in households’ income, price expectations, population, etc. and/or any change in any one or more variables that influence supply such as the costs of production, price expectations and currency revaluations, technological developments, public policies, etc., would invariably bring about a change in market prices.

Demand and supply considerations in the global food market

In a background of supply constraints, the global food market has been experiencing ever-increasing prices. These constraints include adverse weather conditions across the globe, an increase in demand as a result of global population growth, urbanization and affluence in the rapidly developing economies of Asia and South America, the depreciation of the US dollar, and the high cost of oil.

Figure 3 below clearly illustrates, for example, the close relationship between oil and food prices.\(^\text{15}\) This is because agriculture is a heavy consumer of oil products with about 10 to 15 per cent of all energy in the industrialized countries. This is being used for chemical fertilizers, transport fuel, on-farm activities, and for the end of the value chain, that is, the processing of crops and food, refrigeration, and cooking.\(^\text{16}\)

Furthermore, high oil prices have induced heavy investments in the production of ethanol, an important bio-fuel. Between 2007 and 2009 bio-fuels accounted for 20 per cent of the global use of sugar cane, 9 per


\(^{16}\) P. Hawken, L. Amory, and L. Hunter, Natural Capitalism (London, 1999).
cent of vegetable oil and coarse grains and 4 per cent of sugar beet. In 2010 ethanol production accounted to 40 per cent of maize production.\footnote{17}

Indeed, as attested by the HLPE (2011) report on World Food Security, the bio-fuel boom has had a major impact on the evolution of world food demand for cereals and vegetable oil, ‘increasing the share of the industrial use in world consumption of vegetable oils from 11 percent to 24 percent between 2000 and 2010’.\footnote{18}

Moreover, government-imposed mandates to blend fixed proportions of bio-fuels with fossil fuels, or binding targets for shares of bio-fuels in energy use, aggravate the price inelasticity of demand and this has contributed to the volatility in agricultural prices.\footnote{19}

\begin{figure}
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\includegraphics[width=\textwidth]{food_prices.png}
\caption{Food Price Index versus Crude Oil Prices at constant US dollar (2005=100) 1979–2012}
\end{figure}

\begin{flushleft}
\textit{Source: World Bank}
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\textbf{Figure 3: Food Price Index versus Crude Oil Prices at constant US dollar (2005=100) 1979–2012}
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\footnote{17 FAO \textit{et al.} 2011.}
\footnote{18 HLPE 2011, 32.}
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Moreover, government-imposed mandates to blend fixed proportions of bio-fuels with fossil fuels, or binding targets for shares of bio-fuels in energy use, aggravate the price inelasticity of demand and this has contributed to the volatility in agricultural prices.\textsuperscript{20}

Another factor that has led to the food crisis is the use of trade policy restrictions. Around forty food-exporting countries have imposed some sort of trade restrictions, such as food taxes, quotas, or across-the-board export bans. Average tariffs on agricultural and food are high for middle-income and high-income countries, 25 per cent and 22 per cent respectively.\textsuperscript{21} Trade Protectionism on agricultural products is not only as much as four times higher than on non-agricultural products, but it is also much more volatile.\textsuperscript{22}

Agricultural trade policies tend to insulate domestic prices from world markets and lead to pro-cyclic effects. When prices are high, protection decreases, thereby increasing demand on world markets. When world prices are low, protection increases, effectively operating as a variable levy. Therefore, large country trade policies increase world price volatility and create negative externalities for smaller countries.\textsuperscript{23}

In spite of World Trade Organization (WTO) efforts to liberalize world trade, data published by the OECD (2010) indicates that government support in OECD countries still accounts for 22 per cent of the total receipts of agricultural producers. More than half of that support


\textsuperscript{21} FAO et al. 2011.


is delivered in ways that are highly distorting of trade and competition.\textsuperscript{24} A study by the International Food Policy Research Institute\textsuperscript{25} predicts that removal of trade restrictions would reduce world cereal prices by an average of 30 per cent.

The relationship between higher food grain prices and the increased demand for food from the BRICS countries (Brazil, Russia, India, China, and South Africa) is another significant and contentious issue. China and India have huge populations that account for nearly 40 per cent of the total world population. In addition, their per capita incomes have been rising fast in recent years owing to very high levels of economic growth. This is a perfect example of a ‘demand shifter’. As income increases so does the demand for grain, both directly and indirectly because grain is a complementary source of livestock protein. Given current supply balances, one may conclude that such an increase in demand would invariably lead to higher food prices. In theory that would be correct and such a conclusion should explain current global perceptions as to who is mainly responsible for current food price hikes.\textsuperscript{26}

However, facts seem to indicate otherwise. According to the HLPE 2011 report, hardly any change had been registered in the rate of grain consumption in India and China during the last decade. If anything, there has actually been a slowdown:

The apparent acceleration of feed use in the last decade, however, is more linked to a recovery of feed use in the Former Soviet Union after the 1990s. It means that, even with the booming demand for meat in Asia, the growth of feed consumption outside the former Soviet Union is not accelerating but is slowing down ... Excluding use for bio-fuel, the growth rate for non-feed use is stable

\textsuperscript{24} OECD, \textit{Agricultural Policies in OECD Countries: At a Glance}, (Paris, 2010). Available at http://www.oecd.org/document/27/0,3746,en_2649_33773_45538523_1_1_1_1,00.html [Accessed 25 July 2011].


compared with the 1990s and markedly inferior to its historical performance. Without bio-fuel, the growth rate of world cereal consumption is equal to 1.3 per cent compared with 1.8 per cent for bio-fuel.\textsuperscript{27}

The report clearly blows up the ‘myth’ about increased consumption from developing countries leading to higher global demand and therefore, higher grain prices.\textsuperscript{28}

The point to be made here is that while prices are determined by the net effects of aggregate supply and demand changes over time, they cannot in themselves explain their inherent composition. As emphasized by Abbot, Hurt, and Tyner:\textsuperscript{29}

The factors driving current food price increases are complex. We make no attempt to calculate what percentage of price changes are attributable to the many disparate causes, and, indeed, think it is impossible to do so.\textsuperscript{30}

Using a simple price formation model to explain the importance of analysing current price determination on the basis of consumer and producer short run elasticities in conjunction with their long run adaptations to price changes, Timmer concludes that:

The slow and steady shifter of both supply and demand can explain gradual increases in prices, such as seen from the early 2000s until late 2007. The lagged response to earlier periods of low prices can explain some acceleration in these prices, especially for rice and wheat. But the explosion in food prices late in 2007 and in the first half of 2008 clearly requires additional explanation.\textsuperscript{31}

\textsuperscript{27} HLPE 2011, 32.
\textsuperscript{30} Cited in Timmer, 10.
\textsuperscript{31} Ibid., 11.
In other words, while market adaptations to changes in demand and supply may partially explain food price inflation, they cannot fully account for the magnitude of food price hikes and the erratic food price volatility experienced after 2007. Between 2005 and 2008 food prices rose by 83 per cent; wheat prices increased by 127 per cent, rice prices by 170 per cent, and maize prices nearly tripled. Prices started to fall at the end of 2008. The price of rice and wheat dropped by 55 per cent in the second half of 2008, while maize dropped by 64 per cent in the same period. International food prices then started to rise sharply again in the second half of 2010. The price index of food surpassed the peak levels of 2007–08.32 The Food Price Index (FAO 2010)33 increased by over 30 per cent between June and December 2010, while the price index for cereals soared by 57 per cent during the same period.34

It is in the light of these food price explosions that the role of liberalized financial markets and speculation in financial derivatives has to be seen.

Financial derivatives

In today’s globally interconnected and electronically accessible trading system, the role of financial derivatives and speculation in the ongoing food crisis has to be closely analysed. Indeed, evidence shows that large increases in speculative investment, driven by food commodity derivatives, have played a very significant part in pushing up global food prices.35

35 J. Ghosh and C.P. Chandrasekhar (eds.), After Crisis: Adjustment, Recovery and Fragility in East Asia (New Delhi, 2009).
Derivatives are financial instruments that include several types of contracts such as forwards, futures, options, or swaps. Briefly, these may be described as contracts made between two or more parties that agree to sell or buy a certain quantity of assets. Such assets may be stocks, bonds, commodities, currencies, interest rates, or market indexes. Options and futures are the most commonly drafted contracts, the former being financial instruments that convey the right, but not the obligation, to engage in a future commodity transaction. A future contract is a standardized contract with the parties involved binding themselves to a contractual obligation to buy or sell at a certain date in the future, and at a specified price.36

‘Futures’ are extremely important in commerce and they have been used since Greco-Roman times as a form of insurance against commercial risks, a process of commercial speculation also known as ‘hedging’. However, when left unregulated, ‘futures’ may be used as a means of making large profitable gains, sometimes with devastating negative effects on society and the economy. Inflationary pressure may be one such effect. By artificially increasing demand, ‘futures’ may induce prices to increase above their real value and this would in turn induce further purchasing by speculators in the hope that price will continue to rise. A ‘positive feedback loop’ in which prices rise far above the underlying value of the commodity would be created. This is what inflates ‘economic bubbles’.37

While dire consequences, such as the infamous Bengal famine of 1943 in which three million people died,38 may at times be brought about by the manipulation of market prices through the hoarding of essential goods when these are in short supply, more sinister effects may result from the excessive speculation of non-commercial speculators.39 This

37 Ibid.
form of speculation, also known as ‘momentum-based speculation’, allows investors, mainly institutional investors such as banks, insurance companies, and pension funds, to make profits by investing in ‘derivatives’ based on commodity price indices. A commodity index is a large sum of money managed by a specialized fund manager who uses that money to buy a basket of ‘futures’. Values are calculated on the basis of the returns made in the specified commodity exchanges. The most famous index is the S&P GSCI, formerly known as the Goldman Sachs Commodities Index, set up in 1991 and another well known index is the Dow Jones-AIG Index.

The effect of the commodities index funds in post 2008 appears to have been to throw the commodities futures markets into ‘contango’, producing a vicious circle of prices spiralling upward. The US Commodity Futures Trading Commission (CFTC) defines ‘contango’ as the ‘market situation in which prices in succeeding delivery months are progressively higher than in the nearest delivery month’. In no complimentary terms, a European Union Commission Report describes such a situation as ‘… herding behaviour in times of strong (usually upward) price trends, which in developed and easily accessible markets can result in the emergence of speculative bubbles’.

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As index funds generally bet ‘long’ on rising prices, they tend to purchase and hold on to their investments for a longer time than the typical commercial hedger does. This further pushes prices up, attracts even more ‘speculative capital’ into the market and adds to price volatility. As illustrated in Figure 4, ‘spot’ prices increased dramatically after 2002. ‘Futures’ prices then followed suit, setting off a chain-reaction in the market.

Source: Goldman Sachs, Bloomberg CFTC Commitment of Traders CIT Supplement (Cited in Masters and White 2008)

Figure 4: Commodity Index Investment compared to S&P GSCI Spot Price Commodity Index

[Accessed 5 August 2011]
Whereas the traditional speculator may drive up the price of a commodity by physically hoarding the commodity, the index speculator and the fund manager accomplish the same objective by hoarding futures paper contracts for those commodities. They need not bother about maintaining a warehouse; their hoarding is purely and solely virtual.

**Speculation and Food Prices**

Some experts express some scepticism about the role of speculation in inducing commodity price hikes. While confirming the dramatic increase in the number of investors in the futures market and the very strong increase in the share of index funds in the Commodity Futures market before the 2008 peak in commodity prices, Sanders does not see that level of speculative activity as high by historical standards. Gilbert made a similar conclusion, while Krugman bases his scepticism on the argument that speculation in the futures market can only be blamed for increasing food prices if it is accompanied by hoarding. Since there is little evidence of hoarding, he concluded that speculation cannot be the cause of the surge in food prices.

47 Ibid.
Although data on stocks is globally lacking, a point highlighted in the recommendations drawn up in the June 2011 G20 Paris meeting, evidence does exist of hidden hoarding. The IFPRI report pointed out that hidden hoarding may take the form of: ‘households hoarding rice, and importers buying more than they normally do, and these small amounts may add up to sizeable quantities’. In addition, panic buying of food grain and government export restrictions may not be reflected in global stock data, rendering statistical analysis less robust.

Had studies that considered speculation as a main cause of food price hikes incorporated lags in stocks and adjusted this to price changes, the positive correlation between stocks and high food prices would have been even more extenuated. In an econometric analysis carried out by Imai et al in 2008, a rational distributed lag model is used to estimate the positive co-relationship between adjustments in global stocks of wheat, maize, and rice, as they respond to changing current and lagged prices over the period 1986–2008. In their conclusion these researchers assert that

Although the results vary a great deal with the specification used, what is important to note is that there are many cases in which both current and lagged prices have significant effects on the current stocks of these commodities. Specifically, contrary to assertions made, the long-run propensity to hold stocks (or the long-run effect of commodity prices) is positive. In the case of rice, the propensities are substantially larger. This corroborates that speculative hoarding has contributed to exacerbating the shortages in the global food market and thus reignited inflation.  

The fact that rice stocks are more responsive to changes in price than in the case of wheat and maize can be explained by what Timmer calls a rational behavioural response or the ‘psychological hoarding behaviour’ of millions of individuals reacting to the actions of panicky governments who, after seeing the spiralling prices of other grains, imposed export restrictions on rice or imported huge quantities of the grain in order to keep their domestic rice economy stable. Rice is mostly grown by small Asian holders, marketed by a dense network of small traders and processors, purchased by consumers in a readily storable form and stock levels can change quickly at any or all levels of the supply chain. Thus, rice speculation in 2007 and 2008 was mostly the result of hoarding by millions of individual consumers and suppliers. Talk of a price spiral induced a real price spiral.55

In the case of wheat and corn however, Granger Causality tests related to a ‘supply of storage’ model used by Timmer, indicate that price expectations are most likely to be influenced by excess liquidity or what he calls ‘hot money’:

From this perspective, the most volatile element behind the sudden and sharp run-up in food commodity prices was likely to have been the ‘hot money’ in search of the next investment boom, after the crash in tech stocks and then real estate derivatives (and before the financial system itself crashed). The source of this hot money was the massive liquidity infusion provided by the US Federal Reserve System as it sought to stave off (unsuccessfully, as it turns out) a recession caused by collapsing real estate values and subsequent threats to the nation’s financial system.56

In other words, massive liquidity creation led to the financial speculation that overwhelmed the commodities markets, bringing about huge food price increases. Moreover, speculation is so intrinsically entrenched institutionally57 that changes in one or more of the commodity prices, such as oil, invariably affects another, in this case food. In addition, index funds are mandated to keep the value of their commodities in strict proportion.

55 Timmer, 9
56 Ibid.
57 Wise, ‘Food Price Volatility’.
This means that when the prices and value of energy products go up, the funds have to buy more grain futures in order to maintain the mandated proportions. This represents yet another impetus for institutional investors to buy agricultural futures regardless of what is happening to the market fundamentals of supply and demand for food.58

All in all, the evidence as elicited from current literature clearly points its finger at the intimate connection between global food prices and financial speculation as the major cause of the 2008 and 2010/11 food crises. Demand and supply considerations such as the oil crises, rising input costs, bio-fuel mandates, dire weather conditions, soil depletion, inadequate public investment, credit facilities to farmers, trade policy restrictions, and so on, have played a significant part in generating higher food prices. However, the magnitude and volatility of these price hikes cannot be explained by market fundamentals alone. Indeed, food production in the years before the crisis had increased much faster than utilisation, leading to an increase in stocktaking and a fall in global food trade. Furthermore, the aggregate and per capita consumption in both India and China had actually fallen.59

Financial deregulation, particularly the US Commodity Futures Modernization Act in 2000, allowed all investors, including investment banks, hedge funds, and pension funds to trade in commodity ‘futures’ without any position limits, disclosure requirements, or regulatory oversight from the Commodity Futures Trading Commission (CFTC). The legislation allowed ‘index traders’ to use swap agreements in order to take long-term positions in commodity indexes, making it possible for them to trade in commodity futures without the need to exercise any physical ownership of the commodities involved.

It was the manipulation of the commodity markets and the misleading price signals that this generated that led to excessive price volatility in 2008. Financial intermediaries were able to exploit this instability by making huge profits at the expense of both farmers and consumers.60

59 Ibid.
60 Ibid.
The role of speculation in food supply: the case of Malta

As a small island state, with a population of less than half a million and an agricultural sector that contributed less than 2 per cent of its Gross Domestic Product in 2010, Malta plays a role in the global food commodity markets that pales into insignificance when compared to that of the rest of the world. Indeed, neither its production nor its consumption levels, nor its investments in international financial markets can be significant enough to induce an iota of variability in international food prices. On the other hand, Malta’s small size, lack of natural resources and heavy dependence on imports makes it highly vulnerable to international prices, particularly commodity prices.

Indeed, according to FAOSTAT and the United States Department of Agriculture (USDA) data published by Townsend, Malta’s net cereal imports as a share of consumption ranks as one of the highest in the world, at almost 95 per cent. The level of food consumption as a share of total household expenditure ranks as one of the lowest at less than 15 per cent and is at par with that of some of the most developed countries in world. This clearly indicates that while Malta is highly vulnerable to global food price shocks in terms of inflation, it is not as vulnerable in terms of food security as is the case in most developing countries, particularly those in sub-Saharan countries in Africa.

On the other hand, neither can one assume that speculative activities in food commodities do not take place on this island. The Maltese have always been considered as highly entrepreneurial in spirit, and data collated by the Statistical Authority of Malta (NSO), provides some surprising and interesting information. During the short period of

2007–11 when grain prices skyrocketed on the international market, high levels of imports were taking place. This positive co-relationship between rising grain prices and extraordinary grain imports during this period, provides scope for further research in this area.

Total import and export figures of cereals, namely maize, wheat and rice along with sugar show that between the years 2001 and 2006, both the volumes traded and their prices were relatively stable. However, the last three years of the decade were characterised by both high prices and market volatility. This highlights Malta’s vulnerability to the ripple effects brought about by the international markets, such as price inflation. As Figure 5 indicates, Malta (as on February 2009) had an annual rate of food inflation of 10.4 per cent, the second highest in the EU after the UK.

![Figure 5: Malta’s Annual Food Inflation as on February 2009, compared to other EU countries](source)

Source: Eurostat, (as cited by the Rural and Environment Research and Analysis Directorate of the Scottish Gov.)

The import and export of food commodities by Maltese traders

All import and export figures used in this overview incorporate inter-EU and extra-EU trade and all price values are in nominal terms. It is also pertinent to point out that these values do not represent spot market values but an average contractual value related to different grades of a particular commodity. For example, there are at least seven different grades of sugar and about thirty-six different grades of rice. Furthermore, the quantities imported or exported are a function of different variables including anticipated prices, market conditions, exchange rates, as well as storage capacity and these factors have not been separately studied in this overview.

In 2007, Malta imported 97.6 million kg of maize, a 113 per cent increase over the previous year (Fig. 6). Imports increased by a further 10.34 per cent in 2008 and this at a time when prices were increasing at levels ranging between 13 per cent and 30 per cent annually.

By 2010, import figures returned to their pre-2007 levels, levels that averaged out at about 60 million kg of annual maize imports.

Exports figures are even more striking. Malta can hardly be considered as a food exporting nation. As in the case of maize, no significant maize exports were carried out before 2005 and none at all in 2006. However, 33.2 million kg and 27.3 million kg of maize were exported in 2007 and 2008 respectively. Average price per kilo increased from €0.16 in 2007 to €0.25 in 2008, an increase of 56.3 per cent in one year!

A similar pattern may be observed for Durum wheat (Fig. 7). A total of 57.5 million kg was imported between 2007 and 2010, a dramatic increase when compared to a mere total of 418,775 kg imported between 2001 and 2006.

As far as exports are concerned, over 42 million kg of Durum wheat were exported between 2007 and 2010, when none had ever been exported before 2007. In 2008, the value per kilo of exported Durum wheat was €0.40 when compared to €0.17 in 2007, an increase of 135 per cent!
THE GLOBAL FOOD CRISIS

Figure 6: Maize Imports and Exports (2001–10)

Source: NSO
Figure 7: Wheat Imports and Exports (2001–10)

Source: NSO
THE GLOBAL FOOD CRISIS

It is also interesting to note that, while the import trend line for wheat had a negative coefficient of -0.0141 over a ten-year period; that for maize had a positive coefficient of 0.0084 (Fig. 8). In other words, maize imports increased even when prices were increasing, indicating expectations of further price increases.

Source: NSO

Figure 8: Wheat and Maize imports (2001-10) in relation to price
The high increase of both wheat and maize imports in 2007 and 2008, as well as the unexpected and substantial export of both grains in the same period, throws light on the Maltese entrepreneurial spirit in seeking out quick profits. While further research has to be carried out on the hypothesis that international food price hikes were enticing local importers to speculate and make substantial profits by importing, hoarding, and exporting food commodities, the evidence at least seems to lead in that direction. A number of import-export companies may even have been set up for this purpose.

Speculative import-export activities are even more evident in the case of rice and sugar, given that none of these commodities is cultivated in the Maltese islands. With the exceptions of 2004 and 2008, when rice imports fell by 29.6 per cent and 36.4 per cent respectively, imports between 2001 and 2010 stood at around two million kg annually, with the average import price per kilo standing at €0.75 in 2006 (Fig. 9). However, in 2007 the average price rose by 25.3 per cent and by another 20 per cent the following year. While imports were in decline, falling by 4 per cent in 2007 and 36.4 per cent in 2008, rice exports increased by 649 per cent in 2007 over 2006!
An almost identical picture pertains to sugar, with 2007 experiencing the highest level of imports at 33.3 million kg (Fig. 10). Again, this may have been in anticipation of higher prices. In 2008, sugar exports increased by 767.85 per cent at an average value per kg of €0.71. About 90 per cent of this export was intra-EU when usually most sugar exports are extra-EU, particularly to North Africa and Arabian Gulf states.
Both the imports and exports functions for rice extrapolate a positive trend line in relation to price over the period 2001–10, with price being much more volatile in the export market (Fig. 11). In the latter case, the R² value is low at 0.26, indicating that only 26 per cent of the price variations can explain the linear regression. This, however, confirms the high level of volatility on the international spot price market after 2006. Import prices for all the commodities considered here, including sugar, may be relatively more stable because the regular business activities of domestic entrepreneurs is importation, and hedging may have mitigated the excessive volatility that occurred in international spot markets. With the exception of rice, and perhaps some sugar products, hardly any exports had taken place prior to the 2007/08 price hikes and any speculation that occurred was relatively short term.
Commercial speculation of this kind may be having both positive and negative effects on the local domestic market. On the one hand, high price and commercial speculation may be encouraging investment.
in Durum wheat production, a development that should be encouraged given the dire need to protect the last remaining patches of the Maltese rural environment. Domestic Durum wheat production also serves as an important substitute for imported animal fodder and both its labour and capital intensity are relatively low when compared with other currently grown cash crops.

Commercial speculation in rice, sugar, and maize may, on the other hand, lead to inflationary retail prices with ensuing negative effects on the local economy. Nevertheless, deeper analytical research is required on all of these issues.

**Conclusion**

Two issues highlighted in the literature on the current situation in food commodity markets are the long-term trend for food price increases and the excessive volatility of these prices. High and volatile prices generate serious food security concerns. Food security problems underlie global, political, social, and economic stability.

High prices and excessive volatility are usually associated with speculation and price bubbles. Hence, the 2007/08 food crisis triggered a controversial debate about the extent of speculative activities as a root cause of this crisis. The positive co-relationship between hoarding and prices, both current and lagged, has been empirically analysed in a number of econometric studies. In the case of wheat and corn, volatile elements – mainly excess liquidity or ‘hot money’ in search of new investment booms – were an influential factor in driving up price expectations and hoarding behaviour. This substantially exacerbated the shortages in the global food market and led to further price inflation.

Commercial speculation, namely the ‘hedging’ of risks by traders, is generally seen in a positive light, principally because it ensures the availability of much needed liquidity to suppliers, leads to market ‘price discovery’ and enhances trade. It is financial speculation, brought about by the deregulation of financial markets which attracts the greatest controversy. Deregulation dismantled the legal barriers that once separated investment banking from retail banking and also
set aside the supervision of over-the-counter transactions (OTCs) in financial derivatives. Globalization and capital mobility associated with the speculative trading in ‘derivatives’, particularly food commodity index-linked derivatives, overwhelmed commercial speculation and exacerbated both the long-term trend in higher food prices and price volatility.

This resulted in dire economic, social, and political consequences for vulnerable states, particularly poor net food-importing countries. In this light, one may well consider the perpetuation of a food crisis through financial speculation as a moral and legal issue, an infringement on human rights. Legislative efforts, such as the enactment of the Dodd-Frank Act in the US,\textsuperscript{65} and the ‘OTC Derivatives, Central Counterparties and Trade Repositories’ Directive of the EU,\textsuperscript{66} are recent attempts to reform speculative trading. The latter also known as ‘European Market Infrastructure Regulation (EMIR) came into force on 16 August 2012. However, these seem to be too tepid and prone to serious loopholes. Perhaps legislators fear the economic and financial losses that may impinge on the highly lucrative, financial sectors of their economies.

In spite of its small size, Malta too has been involved in food commodity speculation, albeit on a very small scale. However, no matter how small, the level of activity involved attests to the entrepreneurial spirit of the Maltese. Companies that in the past only imported grain for the local market or as a raw material for other processed products increased their imports of grains and sugar in 2006/07 in anticipation of further price increases. Subsequently, as inferred from NSO data, substantial amounts of wheat, maize and rice in particular, were being hoarded and eventually exported at lucrative prices. More in depth studies of this novel aspect of Maltese commercial food commodities speculation have to be carried out in order to substantiate and analyse the economic effects of these import-export activities.

\textsuperscript{65} CFTC 2011.