



# Simulation of Shariah Compliant Commodity Backed Currency System: A Turkish Case-Study

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**Abstract:** In view of the continuing episodes of financial crises faced by the Turkish economy, this study analyses the potential economic benefit of implementing the Grondona system of conditional currency convertibility. The authors performed simulations of the Grondona system based on Grondona's guidelines (1975) in order to examine the impact of the system's operations on the Turkish economy. For simulations, the annual data about Turkish primary commodity imports was retrieved using the WITS (World Integrated Trade Solution) software developed by the World Bank. The monthly data about primary commodity prices was accessed from the IndexMundi website. The authors used a program developed in C++ for performing simulations, and analyzed the simulation results by using Microsoft Excel. The results of the simulations clearly show the system's role in stockpiling reserves of primary imported commodities in response to a fall in market prices, and releasing the reserves during periods of rising prices. Such a mechanism helps to stabilise the prices of primary commodities and lessen the pressure on primary commodities markets during both slump and boom periods. Graphs are also included to show how the Commodities Reserve Department's (CRD) transactions would have caused corresponding changes in the Turkish money supply. These would have a stabilizing influence on the real value of the Turkish Lira in terms of the commodities handled. In addition the paper discusses the multiple reasons why the system has been judged to be Shariah-compliant.

**Keywords:** Commodity Backed Currency System, Simulation, Turkey, Financial Crises, Shariah Compliant.

**JEL Codes:** E51, E52, Z12

One beneficial consequence of these changes is that the global instability of the riba-based monetary system has been widely exposed, and the long-standing taboo against discussing it publicly is breaking down. More and more people are coming

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 © Research Center for Islamic Economics  
DOI: 10.26414/m029  
TUJISE, 5(2), 2018, 95-128  
[tujise.org](http://tujise.org)

 Submitted : 01.03.2018  
Revised : 29.06.2018  
Accepted : 31.07.2018  
Published : 15.08.2018



to understand it, as more and more books, articles, videos and websites reveal this long-hidden problem and discuss means for solving it (Brown & Simpson, 2012; Positive Money, n.d.; Public Banking Institute, n.d.; Still, 1996; Zarlenga, 2002).

In short, nearly all the new money entering the economy today starts as interest-bearing debt to the banking system.

This system is quite different from the past, when the right to create money belonged to the sovereign or government, the profit (known as seignorage) being used for the benefit of the country. The present monetary system is fundamentally unjust since it progressively concentrates wealth in the hands of the controllers of the banking system, while making everyone else poorer. The need for democratic revolutions in the rich countries, in order to return “the money power” to the people, is the subject of much discussion (Hoppe, 1994; Lietaer, 2001; Greco, 2009).

For those who wish to understand, it is now clear that the governments of the rich countries, notably the USA, UK and other Anglo-Saxon countries, far from being democratic, are little more than supporters of the riba-based financial system. All their policies advance the riba-based financial system globally, contrary to the interests of their own people.

Keeping in view the instability of the riba-based monetary system, there are many countries which have faced numerous financial and economic crises since the demise of Bretton Woods system (Ahmed, 2015). Turkey is one of several countries which have suffered from the instability of the present system. The Turkish economy has faced three main crises from 1990 to 2001 – and is currently facing the 4<sup>th</sup> one. As a result of the 2001 crisis faced by the Turkish economy, the Turkish Government implemented the economic reforms program namely “Transition to Strong Economy” after an agreement with the IMF (Çetin & Gallo, 2012). Despite these economic reforms, the Turkish economy is once again facing economic troubles (McNamara, 2017; Wheatley, 2017). The Turkish president Recep Tayyip Erdogan has spoken about the weakening of the Turkish Lira against the US Dollar as “...the economy is manipulated with the objective of attacking Turkey. There is no single difference between the terrorist who carries a weapon in his hand and the terrorist who possesses a dollar or euro in his pocket. Both aim to divert Turkey from its targets. They use currency as a weapon” (Candar, 2017). Greco (2009, p. 197) described today’s money as “political money”; it is exploited to acquire power and wealth by controlling the banking system. Consequently, money at present is “exploitative”, “dysfunctional” and “undemocratic”. Furthermore, many schol-

ars have attributed these financial crises to the failure of the existing monetary system. They argue that fiat money, interest charges and fractional reserve banking are the underlying reasons for the existing monetary system's collapse (Hoppe, 1994; Usmani, 2001; Lietaer, 2001; Meera and Aziz, 2002; Greco, 2009 and El Diwany, 2009).

Considering the recent crises faced by the Turkish economy, this study performed simulations of the conditional currency convertibility system developed in the 1950s by Leo St. Clare Grondona, who claimed to have developed a practical solution to this problem. The Grondona system of conditional currency convertibility is based on durable, essential, basic imported primary commodities which provide a conditional mechanism for stabilizing the real value of money in terms of primary commodities. It would partially stabilize the prices of primary commodities and help reduce the fluctuations over the business cycle.

The Grondona system was evaluated from the Shariah perspective and found to be in line with the guidelines of Shariah (Ahmed, 2015; Ahmed, Meera, & Collins, 2014; Ahmed, Meera, Collins, & Saleem, 2018). As discussed further in the second section below, the Shariah-compliance of the system has four aspects. First, it involves no debt or interest payments in its implementation or operation. Second, it is based on the counter-cyclical principle of Prophet Yusuf (AS), thereby stabilizing the foundation of the economy by ameliorating surpluses through stockpiling, and reducing shortages by releasing the stored reserves. Third, it partially stabilises the value of the currency which it uses by making it reliably convertible into real commodities, and thereby forms a step towards resuming gold convertibility. Fourth, it does not use the *discretionary* powers of central banks, which are responsible for the operation of the current debt-based monetary system which is itself *riba*, but operates automatically in response to market forces. It thereby avoids the need to deal with the complex issues of Islamic Central Banking.

The current study simulates the operation of this system and examines the influence of conditional currency convertibility system for Turkish economy. For performing simulations, the annual prices and quantities of primary imported commodities from 2005 to 2008 were used to design the system's implementation, and monthly market prices of primary imported commodities of Turkey for the period of 2009-2017 were used to simulate its operation.

## Conditional Currency Convertibility System

The commodity convertibility system developed by Grondona is actually based on the original and ancient philosophy of maintaining reserves of commodities which can be traced back to the story of Prophet Yusuf (AS) in Egypt as explained in the Holy Quran; where Prophet Yusuf (AS) interpreted the dream of the King and warned him of seven years of calamity exactly following the seven years of abundance (good crops). He advised him to hold the reserves of wheat in granaries during the good years, and use them in the difficult times of the seven years of famine. This ancient philosophy of maintaining reserves was incorporated by many economists (for example, Keynes, 1938; Graham, 1940; Grondona, 1952; Hart, Kaldor and Tinbergen, 1964; and Lietaer, 2001) into their proposals for attaining macroeconomic stability (Ahmed et al., 2014).

During the 1950s, the Australian economist Leo St. Clare Grondona (1880-1982) devised a unique system of *conditional* currency convertibility based on primary imported commodities – which is at the same time a system of partial price stabilisation for primary commodities (Grondona, 1975). Grondona's system was highly praised in the United Kingdom (UK) parliament and press in the 1950s. Some eminent economists and mainstream economic media supported Grondona in the following words:

“A powerful automatic stabilizer...The Grondona system would enormously enhance the effectiveness of monetary policy” (Professor Lord Nicholas Kaldor cited in Grondona, 1975, p.15).

“Mr. Grondona proffers a long-term solution to a problem which, thus far, has baffled not only HM Government but government the world over...The tragedy is that his highly practical proposals have not long since been implemented” (Sir Roy Harrod cited in Grondona, 1975, p. 9).

“It can be only a question of time before man's reason and self-interest overcome his inertia and Mr. Grondona's proposal is accepted. When they are, they will define the beginning of an era as surely as did the introduction of the gold standard...” (The Manager, 1958 cited in Collins, 1985 p. 220).

### **Explanation of the Conditional Currency Convertibility System**

Leo Grondona described his system of partial price stabilization of primary commodities in detail in many speeches, articles and papers, starting from 1950 (Grondona, 1950) and in a series of books (Grondona, 1958, 1962, 1964, 1972,

1975). The underlying idea of Grondona's conditional currency convertibility system is very simple, but in critical points it is different from related proposals (for example Keynes, 1938; Graham, 1940; Hart, Kaldor and Tinbergen, 1964; and Lietaer, 2001), and so the effects of its operation are very different. In particular, the financial liability involved in implementing the system is limited in advance by the government establishing it, thereby avoiding the open-ended liability involved in commodity "buffer-stock" schemes which attempt to limit the movement of commodity prices to a *fixed* range. This has the important implication that, in contrast to other proposals for commodity-based currency, individual countries are able to implement the Grondona system independently in terms of their own currencies, paying for purchases of reserves through monetary expansion rather than taxation, as under the gold standard. Under the original gold standard, a specialized department of the central bank stood ready to exchange monetary units on demand for gold of specified purity, in specified units of quantity, at specified buying and selling prices – known in England as the "gold points". By analogy, under the Grondona system a specialized government department, the "CRD" would be established which would stand ready to exchange monetary units on demand for specified commodities of specified purity, in specified units of quantity, at specified but *conditional* prices, which Grondona termed the system's "points". This conditional currency system would treat each commodity independently unlike other proposals of commodity reserve currency. Nor is it based on any sort of collective unit / basket of commodities, nor does it involve *fixed* price limits. As a result, it would not prevent market prices adjusting; it would rather help reduce the fluctuations in commodity prices. Additionally, this system would also be helpful in avoiding the problems of dealing with a basket of commodities as proposed by Graham, (1940), Hart, Kaldor and Tinbergen (1964), Borsodi (1989), Greco (1990) and Lietaer (2001). Another critical difference from other related proposals is that the CRD's guarantee to provide commodities on demand in exchange for monetary units at specified prices would apply only as long as the CRD was holding reserves (the exact levels of which would be publicly known at all times). Thus, on occasions, the reserves of one or more commodities might fall to zero (see Table 1 and Figure 1). However, the CRD's guarantee to purchase that commodity would still be effective; thereby continuing to provide support to the market, and reserves of the commodity would be likely to subsequently accumulate again, making the CRD's selling price effective once more.

The means by which Grondona system achieves this flexibility is that, instead

of being fixed, the range within which the market price of each commodity is stabilized would itself adjust according to market conditions, as indicated by the level of commodity reserves held. The transactions of a CRD would be determined by market participants, thereby making its role completely passive, and not dependent on discretionary decisions of the central bank or any other part of government (Collins, 2002). The transactions of the CRD would alter the country's money supply by an amount equivalent to the value of net sales to and purchases from the CRD. Furthermore, the CRD would publish the price-schedule for each commodity and/or grade which it handled, and the level of reserves of each commodity would also be made public daily (Collins, 1996). This and other details of Grondona's system are described at length in his own works (Grondona, 1975) and in (Collins, 1985). However, some of the important implications are described briefly below.

### **Minimal costs**

Understanding the pitfalls to be avoided, Grondona worked out the administrative details of his system so as to minimize its operating costs; eliminate discretion; and to make its operation entirely transparent. Hence the system would handle only durable, essential, basic, imported commodities, at least initially. These differ between countries, but typically include Copper, Nickel, Aluminium, Lead, Zinc, Tin, Wool, Cotton, Rubber, Coffee Beans, Cocoa Beans, Raw Sugar, Wheat, Barley, Oat, Maize, Soya Beans and Rice. The CRD would also handle only pre-specified, large units of quantity of standard commodity grades; it would be entirely passive in its functioning, never entering the market but responding predictably to requests from the market participants; and all costs of appraisal and delivery would be at customers' expense. In this way, the system would have no operating costs except for building maintenance and a small administrative staff. The remaining cost is that of construction of the necessary warehouses.

### **Liability limited**

Other schemes, including the proposed UNCTAD "Common Fund", generally aim to stabilize commodity prices between *fixed* limits. This creates an *unlimited* liability, which would require international agreement between many countries to support, and is economically undesirable. By contrast, by being less ambitious than such schemes, Grondona's *conditional* system would not involve an open-ended liability, thereby avoiding the problems that make more ambitious proposals impractical. One of Grondona's important insights was to understand that even a conditional

commodity standard that in itself had only a limited stabilizing influence, would be valuable. Once in operation, the system's influence could subsequently be strengthened as desired, by increasing the scale and range of operation, and by increasing the number of countries implementing the system.

### ***National systems independent***

The scale appropriate to a country's needs, and the maximum outlay that might be required for each commodity under extreme market conditions, could be estimated in advance, while the maximum price for any commodity involved would be guaranteed only as long as reserves were held. Thus the increase in reserves that movements in commodity prices would cause under different economic conditions would be limited to predetermined quantities. Because the CRD's reserves would rise and fall counter-cyclically, they could be funded like purchase of gold under the gold standard by increasing the money supply; so it would not be necessary to offset them with taxation or borrowing. This has the important consequence that, unlike most related proposals, individual countries could implement the system independently in terms of their own currency. Hence the Grondona system would not require international agreement for its implementation or continued operation, and its benefits would not be restricted to the single currency used by such an international system. This unique feature of Grondona's proposal alone is of the greatest importance.

### ***Monetary policy not distorted***

Because the CRD's guarantees of convertibility would be *conditional*, the implementation of Grondona's proposal would not constrain a country's monetary policy as the operation of the gold standard did. Like the gold standard, the operation of the system would lead to counter-cyclical changes in the money supply that tended to maintain a constant real value of the currency unit, which is fundamentally desirable. However, unlike the gold standard, the overall scale of these changes would be decided in advance, rather than being unlimited. This enables the monetary authorities to counteract the changes in the money supply caused by the CRD, if desired, without undoing its other stabilizing effects. However, it seems more likely that the central bank would come to find the CRD's monetary effects, a useful guide to policy.

### ***Cost of implementation***

Since payments for the CRD's purchases of reserves would be through changes in the money supply, the only significant cost of implementation is the cost of stora-

ge of physical reserves. Commercial storage services typically cost a few percent / year for the commodities concerned, but Grondona explained how the cost could be reduced by building dedicated warehouses to match the CRD's specialized needs – notably it is handling only large units of quantity. Appraisal and delivery costs would be paid by customers, so the only costs remaining are those of construction and maintenance.

### ***No conflict between multiple national systems***

Even in the absence of formal coordination between different countries implementing the Grondona system there would be no danger of damaging competition or friction between the different countries' CRDs. That is, any "competition" in the form of trying to increase the relative influence of their national CRD would lead different countries to increase the scale of their CRDs. This would enhance the overall stability of the economic system, but without harming other countries' CRDs. There would also be extensive opportunities for both informal and formal cooperation between governments and central banks of countries operating under the Grondona system.

In the extreme case in which one country enhanced its CRD to such an extent that other CRDs received few requests to buy or sell reserves, this would mean that both commodity prices and exchange-rates had become unprecedentedly stable – which is the objective of the system. Further, such a policy would be naturally limited, since if one country's CRD was enhanced excessively, there would be a growing risk that it could face high storage costs which would not be offset by subsequent sales of reserves, due to the price stability achieved; this would provide a natural incentive for individual countries not to establish a CRD on an excessive scale.

## **The Fixed Price Schedule, its Rules and Parameters**

### ***Fixed "Price Schedule"***

The CRD would function under some important rules formulated by Grondona (1975). Those rules guarantee that the prices at which the CRD stands ready to buy or sell reserves of individual commodities on demand from traders would remain in line with the market forces. For that, the CRD maintains a fixed "price schedule" for each commodity separately. The price schedule would primarily include the buying / selling prices (lower / upper points) of each commodity and the prescribed

quantity for each individual commodity, (which Grondona called a “Block”) which triggers a step-change in the CRD’s buying or selling price (see Table 1). Thus the CRD’s buying and selling prices adjust automatically according to the fixed price schedule in the opposite direction to the level of reserves held by the CRD, following the market forces. Consequently the price schedules used by the CRD would not distort commodity market prices by preventing large movements, but would rather lessen large and sudden fluctuations. The automatic price adjustment mechanism of the Grondona system is illustrated by the hypothetical price schedule shown in Figure 1.

The example shown in Table 1 and Figure 1 follows Grondona’s initial guidelines: the initial lower and upper “points” are 10% below and above the previous medium-term average import price (c.i.f.), and these would adjust by 5% of their initial levels when reserves of the commodity reach a “Block” equal to 10% of average annual imports. The price-range would thereby remain a constant percentage of the CRD’s current low point.

*Table 1.*  
Hypothetical Price Schedule for a Single Commodity

CRD Buying Price (Lower Point) (RM/Tonne)	CRD Selling Price (Upper Point) (RM/Tonne)	Quantity in Malaysian CRD Reserves (Kilo Tonnes)	Number of Blocks
900	1100	0-39*	1
855	1045	40-79	2
810	990	80-119	3
765	935	120-159	4
720	880	160-199	5
675	825	200-239	6

\* Minimum unit is 1000 tonnes, “block” of each commodity is 40,000 tonnes.

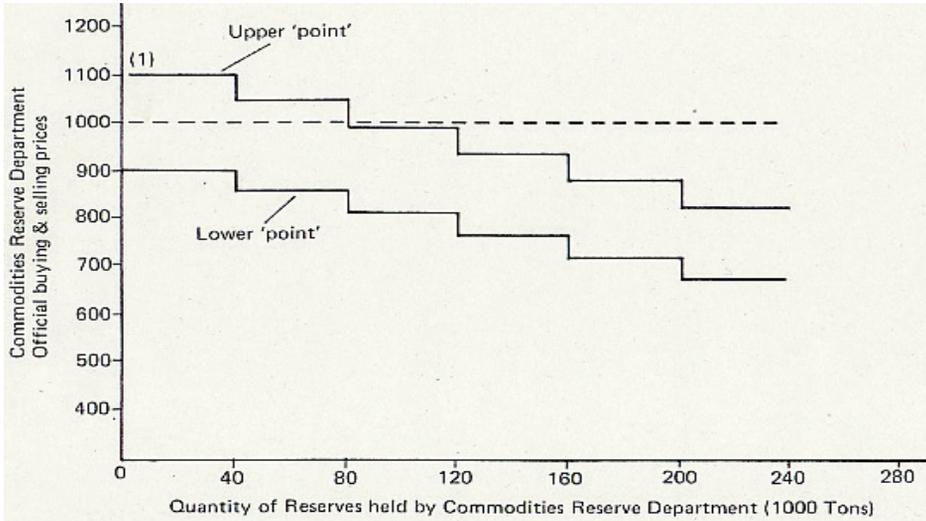


Figure 1. Illustrative Price schedule for a Single Commodity of Commodity Reserve Department

With the Grondona system in operation in a particular country, when a commodity’s market price in that country’s currency was falling, traders would spontaneously sell stocks to the CRD. When these stocks rose to a pre-specified quantity (which Grondona termed a “Block”), the CRD’s official buying and selling prices for that commodity (its “points”) would fall by a pre-specified amount (as shown in Table 1 and Figure 1). If market prices fell further to this new, lower “point” and reserves continued to accumulate, the process would repeat, and the cycle would continue until the CRD’s buying price (lower “point”) fell low enough to be unattractive to sellers.

Later, when market prices recovered, buyers would repurchase supplies from the CRD at successively higher selling prices (upper “points”) in its published reserve price schedule, as each in turn became attractive relative to current market prices. In other words, no commodity’s market price expressed in the national currency would move outside the band between the CRD’s current lower and upper “points” for that commodity.

### Rules for Operation of CRD

Besides the basic principle of fixed price schedule, Grondona developed some other rules for smooth operation of the CRD. Collins (1985) explains those rules as follows:

Rules for CRD's operation	Explanation
1	<p>The CRD's maximum upper point (or selling price) for any individual commodity is conditional to the availability of that commodity's reserves with CRD. In other words, if and when the CRD's reserves of any specific commodity are exhausted, it would no longer guarantee the maximum selling price. However, it would guarantee the lower point until the accumulation of reserves once again. This enables the system to avoid open-ended financial commitment by not guaranteeing the fixed maximum price. This will also prevent the system from distorting commodity markets, and avoids the need for an international system (which would be required to handle an unlimited liability).</p>
2	<p>The margin between lower and upper points for each commodity should be substantially higher than the 0.2 percent margin maintained under the gold standard. The optimal margin varies among the commodities and depends on the extent of fluctuations for each commodity. For commodities, having high market price fluctuations, a margin of 20 percent would be adequate. Conversely, the price band of 10 percent is considered to be suitable for commodities with low level of fluctuation.</p>
3	<p>The CRD earns premium (profit) due to the pre-determined range between the CRD's buying (lower point) and selling (upper point) prices. The CRD keeps the customers aware of these pre-determined ranges in prices via CRD's "price-schedule" which is publicized on a regular basis. A portion of this premium is used for covering the administrative costs. The remaining portion of the premium is deposited in a "Special Holding Account" in order to form a "Disaster Fund" that can be used for many purposes including providing relief for disasters around the world.</p>

4	<p>The system would include only the durable, essential, basic imported commodities. For commodities which have different major standard grades, these would be handled separately by the CRD. The initial list of CRD would include only the main, imported non-fuel commodities. It would not consider domestically produced commodities, nor commodities with high storage cost for inclusion. The reason for not including the domestic commodities is the existence of domestic price support arrangements. However, once the system is operational, these commodities could also be included.</p>
5	<p>The CRD would function on a large scale by dealing solely with large units of quantity of individual commodities (or standard grades of commodities) stipulated in the price schedule, for example 40 tonne units. This would facilitate the system to attain the main economic benefits of currency convertibility at low cost.</p>
6	<p>The CRD would only accept the national currency for settling its transactions. It would make payments only in the national currency for the commodities sold to it by traders, and accept only national currency from traders for repurchase of commodities. Consequently, the system would stabilise the value of the national currency based on the prices of primary imported commodities. It would also help to determine the maximum outlay involved in implementing the system.</p>
7	<p>All the CRD's transactions would be according to "Customs Bond"; the CRD would not be liable to payment of tariffs or duties. The buyers would pay all these charges at the time of purchase of individual commodities from CRD reserves. This would make the system compatible with international trade agreements and promote free trade in primary commodities.</p>
8	<p>The commercial seller or buyer of the commodity would be responsible for payment of all charges pertaining to appraisal, transportation and handling when doing transactions with CRD. This would bring the operating costs of CRD to its minimum. The CRD would require only a small staff, mainly for clerical works.</p>

## **Parameters of the Price Schedule**

Grondona (1975) described the parameters of the price schedules for specified commodities which he named the “gearing” of the system. These parameters are important in deciding the extent of the system’s monetary and economic influence, and the government’s financial commitment involved in the implementation of conditional currency convertibility. These parameters include the range of commodities (and grades), initial price levels, size of blocks, width of price-bands and price-steps between successive price-bands. There are a number of factors that need to be considered in deciding each of these parameters. This would also help determine the optimum scale of the system to have a stabilizing effect on the national economy.

### **Range of Commodities**

The range of commodities that should be included within the scope of a CRD would depend on the conditions of the country implementing the system, but only those commodities that are durable, basic, essential imports would be suitable. Of these Grondona (1975) proposed that the commodities of which domestic production is the main source of supply, and fuel minerals should be excluded, at least initially. With these exceptions, the wider the range of commodities included the greater would be the influence of the system in stabilizing both the real value of the currency and the pattern of relative prices of different commodities.

### **Initial Price Levels**

Grondona (1975) argued that, other things being equal, an initial index for each commodity should be set at the previous average c.i.f<sup>1</sup>. Price for each commodity concerned (based on the average trend of past years’ prices, adjusted for inflation), and that the CRD’s initial lower and upper points should be set at equal percentages below and above this figure. The higher initial levels of the lower and upper points of CRD would have greater anti-inflationary influence under rising prices.

### **Size of Blocks**

The remaining features of the price schedules – the quantity in a Block of each commodity, the width of the price band between lower and upper points, and size of the price steps between successive price bands – would together determine the scale of the outlay that might be required under the operation of the system. For the quan-

1 C.I.F. stands for Cost, Insurance and Freight.

tity in the Block, Grondona (1975) proposed that a figure of the order of 10 percent of average annual imports would be a reasonable figure for many commodities. This would be large enough to give significant 'inertia' to a CRD's commodity points, but sufficiently small for the accumulation of several such 'Blocks' of one or more commodities to be acceptable. In practice the percentage of a country's annual imports contained in a 'Block' might be set at a different level for different commodities according to a number of different criteria. These might include the trend in the level of national imports; the relative importance of the commodity; the percentage of world production or trade represented by national imports; and the cost of storage of the commodity. Thus for some commodities the quantity in the CRD's 'Block' size may be as large as 20 percent or more of average annual imports.

### Width of Price-Bands

The width of the price band is the difference between the lower and upper points of the CRD for each commodity. The most suitable width for the price-band would vary from one commodity to another depending in particular on the range of price fluctuations that was normal for each commodity. As in the case of the initial levels of CRD's 'points', the precise value would not be critical. The narrower the range, the more frequent the recourse to the CRD, while the wider the range, the less frequent the movements in the levels of reserves. For more unstable commodities, Grondona (1975) proposed that a price range of approximately 10 percent below and above the initial index would be reasonable, being wide enough to cushion large fluctuations. However, there are various factors such as normal size of price fluctuations for the commodity, the pattern of resulting monetary impacts and the expected improvement in price-stability for each commodity, which are pertinent to consider in determining the appropriate price-band for each commodity.

### Price-Steps between Successive Price-Bands

Finally, given the other figures in a commodity's price schedule, the size of the prices-step between successive price-bands would determine the total quantity of reserves that could be expected to accumulate at any given market price for the commodity. For reasons of simplicity and uniformity Grondona (1975) considered that it would be desirable to maintain a constant 5% of initial values. This figure is small enough to avoid any market distortion as result of CRD's upper and lower point adjustment; but it would be large enough to limit the maximum quantity of reserves likely to be held. However, the value of this parameter may vary for different commodities (Grondona, 1975).

### **Grondona System from Shariah View Point**

Ahmed (2015) and Ahmed et al. (2018) analyzed the Grondona system from the *Shariah* perspective and found it to be in compliance with *Shariah* based on the following reasons. First, it involves no debt or interest payments in its implementation or operation, despite of the fact that it could be implemented in conjunction with the existing monetary system of the country. Second, the Grondona system is based on the fundamental idea of Prophet Yusuf (AS) whereby the CRD establishes reserves of primary commodities during times of abundance and releases those reserves during periods of scarcity, which would help to stabilise the business cycle through its counter-cyclical effect. It would also have stabilising effects on the value of the domestic currency and on the economy as a whole. Third, it could be taken as an initial step towards real money like gold by giving intrinsic value to the money in circulation. Fourth, the role of CRD in the market always remains passive and as a result it will not interrupt the free market conditions; its operations would be determined by the free market forces of demand and supply (Grondona, 1975; Collins, 1985). That is, it operates under the principle of free market which is strongly supported by Islam. The following *hadith* of Prophet (peace be upon him) upholds the principle of free market:

There were complaints that the prices of certain items were high and people requested the Holy Prophet (peace be upon him) to fix the prices. He replied: “Allah is the one who fixes price, who withholds, who gives lavishly, and who provides, and I hope that when I meet Him, none of you would have a claim against me for any injustice with regard to blood or property”.<sup>2</sup>

The *hadith* indicates that prices are determined by forces which are beyond human control. Prices are determined by the complex market factors over which no individual actor has any control, which among others include supply, demand and competition. These forces propel market towards equilibrium and determine a fair price for commodities, goods, and labour. Additionally, the *hadith* indicates that the state should not interfere in the process of price determination in situations where the cause of rise in price is natural (i.e. *Taqdir* from Allah) for example famine etc. In such conditions, price determination by the state (*tas'eer*) or any other state interference that disturbs the normal market conditions and equilibrium is harmful. State non-interference in the market is therefore a principle (Saleem, 2012).

2 Sunan al-Tirmidhi, Babu Ma Jaya fi al-Tassayir, vol. 5, p. 278, no. 1362. See also Yusuf al-Qaradawi, *The Lawful and the Prohibited in Islam*, translated by Kamal El-Helbawy (Kuala Lumpur: Islamic Book Trust, 1995) p. 255.

Furthermore, the discussion of the supporting statements of prominent economists and economics media highlighted that the Grondona system benefits the country that implements it in many ways. First, it creates a link between the national currency and real commodities. Second, it is automatically counter-cyclical over the business cycle. Third, it helps the implementing country to maintain reserves of primary commodities. Fourth, from perspective of multi-national implementation, it would help to increase intra-OIC trade among Muslim countries. Fifth, it would help the least developed countries of the OIC which mainly depend on exporting primary commodities (mostly agriculture). Considering these benefits, it may be inferred that implementation of the Grondona system is in accordance with *siyasah shariyyah* because it helps to secure *maslahah* (Collective benefit) and prevents *mafsadah* (harm). According to the words of Ibn Qayyim (1961), “any measure which actually brings the people closest to beneficence (*salah*) and furthest away from corruption (*fasad*) partakes in just *siyasah*....”. Moreover, Kamali (1999; 2005) asserts that any steps taken for establishing justice and for promotion of public welfare and prevention of corruption fall within the domain of *siyasah shariyyah*.

Considering the conformity of the Grondona system with *siyasah shariyyah*, the OIC (Organization of Islamic Cooperation) countries may consider its implementation as a policy matter for the transitional period depending on the results of simulations analyzed in the next section of this paper. This will help them to take the first step towards linking their currencies with real commodities whereby they can gradually transform their existing monetary systems into commodity-based systems, such as the gold Dinar system, which ensures the economic well-being of each country. Finally, being activated by market forces, the operation of the CRD does not depend on discretionary decisions by the central banks which control the present-day *riba* system of debt-based money. The system thereby avoids the need to solve the complex theoretical and practical issues of establishing true Islamic central banking.

## Research Methodology

This study performed simulations to examine the effect of the operations of a Turkish CRD on the Turkish economy. The simulations were based on the principles and guidelines suggested by Grondona (1975), as described above. For performing the simulations, the authors used a simple program developed in C++. In addition,

the authors also used Microsoft Excel in the simulation phase. The data required for the simulations included annual data about Turkey's imports of primary commodities, and monthly market prices of primary commodities. The authors used 4 years annual data (2005-2008) about Turkish primary commodity imports, and 10 years data (2009-2017) about monthly market prices of primary commodities. The simulations are based on data for year 2005 onwards because information of import trade before that year is very limited, although market price information for primary commodities is available for decades.

### **Data Description**

The authors selected the Turkish primary imported commodities based on the attributes proposed by Grondona (1975). Initially the authors identified the product codes of the required primary commodities by using their product descriptions; since all the commodities and products involved in world trade (whether import or export) are classified and recorded in terms of various nomenclatures and versions depending on the country/period. Some of the commonly used nomenclatures are Standard International Trade Classification (SITC), Harmonized Commodity Description and Coding System (also called Harmonized System or HS), The International Standard Industrial Classification (ISIC), Broad Economic Categories (BEC), Global Trade Analysis Project (GTAP) and Standard Industrial Classification (SIC). However, HS and SITC are the two native nomenclatures (World Integrated Trade Solution [WITS], 2013a,b). The authors used HS 6-digit codes to choose the list of primary imported commodities for Turkey, because the HS classification provides more detail than the SITC nomenclature and it has been used since 1988 (WITS, 2013a). The HS 6-digit codes for primary imported commodities of Turkey are listed in Table 2.

*Table 2.*

List of Turkish Primary Imported Commodities with HS Codes

<b>Product Description</b>	<b>HS Product Codes</b>
Coffee Not Roast, Not Decaffeinated	090111
Durum Wheat	100110
Barley	100300
Soya Beans; Whether or Not Broken	120100

Cocoa Beans, Whole, Broken Raw or Roast	180100
Raw Sugar, Not Containing Added Flavouring or Colouring Matter: Cane Sugar	170111
Cotton, Not Carded or Combed	520100
Shorn Wool, Greasy, Not Carded or Combed	510111
Shorn Wool, Degreased Not Carbonised, Not Carded or Combed	510121
Rice in Husk (Paddy or Rough)	100610
Maize (Corn) Seed	100510
Other Maize (Corn)	100590
Refined Copper Cathodes & Section	740311
Nickel, Not Alloyed	750210
Aluminium, Not Alloyed	760110
Refined Lead	780110
Zinc Con by WT > 99.99% Not Ally	790111
Zinc Con by WT < 99.99% Not Ally	790112
Tin, Not Alloyed	800110

The annual trade information about the primary imported commodities of Turkey was retrieved using the WITS software (World Integrated Trade Solution) developed by the World Bank. This software gives access to databases of various International Organizations including, United Nations Conference on Trade and Development (UNCTAD), International Trade Centre (ITC), United Nations Statistical Division (UNSD) and World Trade Organization (WTO). WITS provides information on trade and tariffs based on various nomenclatures (WITS, 2013b).

The data about monthly market prices of primary commodities for Turkey were acquired from the IndexMundi website. Since monthly data about primary commodity prices was not available in Turkish Lira, the authors used the USD monthly market prices of primary commodities from IndexMundi website and converted them into Turkish Lira by simply multiplying them with their respective USD exchange rates.

## Selection of Gearing of the Grondona System

Before performing the simulation, the five parameters (the “gearing” of the system) of the price schedule needed to be decided. Those five parameters include the Range of Primary Commodities, Initial Price Level, Size of Blocks, Width of Price-Bands and Price-Steps between the Successive Price-Bands. In practice, there are various factors which need to be taken into account while determining the optimal values for these parameters. For the purpose of this research, the authors initially used the values of the parameters recommended by Grondona (1975) and some other prominent economists (like Keynes, Graham and Kaldor).

### *Range of Commodities*

The range of commodities suggested by the proponents of commodity reserve currency systems (particularly Keynes, 1974; Graham, 1944; Grondona, 1975; Hart, Kaldor and Tinbergen, 1964 and Lietaer, 2001) include the basic, durable and standardized commodities which are traded in international markets. According to Keynes, Graham, Grondona and Kaldor, the eligible commodities would be key standardized commodities which are commonly used across the world. These standardized commodities should carry low cost of storage with proper inventory management to avoid spoilage (Grondona, 1975; Collins, 1985; Ussher, 2011). However, there are different viewpoints regarding the number of commodities to be included within the scope of commodity reserve currency systems. In addition, Grondona (1975) suggested excluding oil from the list of primary commodities at least initially. Likewise, Kaldor also supported ignoring coal and oil from the list of buffer stocks (Ussher, 2012).

Grondona (1975) proposed to include only those commodities which are basic, durable, essential, and imported. Hence the major genres of primary commodities included within the scope of the Grondona system are industrial metals, textile and fibrous raw materials, natural rubber, grains and certain food basics, although the number of commodities included within the scope of the CRD varies from country to country according to their conditions (Grondona, 1952; Grondona, 1975; Collins, 1985). The list of Turkish primary imported commodities finalized for including in the simulation is shown in Table 3.

*Table 3.***List of Turkish Primary Imported Commodities Selected for Simulation**

<b>Country</b>	<b>Agriculture</b>	<b>Metal</b>	<b>Total Commodities</b>
Turkey	Wheat; Soybean; Coffee; Cocoa Beans; Maize (Corn) Seeds; Cotton; Barley, Rice in Husk	Copper; Nickel; Lead; Tin; Zinc; Aluminium	14

*Initial Price Level*

According to Grondona, the initial price level or initial index should be based on the previous average c.i.f. price for each primary commodity concerned, but compensated for inflation if needed - otherwise market prices might remain permanently above the system's purchase prices (Grondona, 1952; Grondona, 1975; Collins, 1985). Graham and Kaldor were also of the opinion to set their target basket index on historical average valuation (Ussher, 2011).

*Size of Blocks*

Grondona suggested 10 percent of average annual imports as an appropriate figure for the Block size for many commodities, although there would be no need for uniformity (Grondona, 1959; Grondona, 1975; Collins, 1985).

*Width of Price-Bands*

For accommodating the normal market activities, Grondona's proposed width of price-band is 10 percent below and above the initial price level (initial index) (Grondona, 1952; Grondona, 1975; Collins, 1985). Keynes also recommended that the price range of 10 percent below or above the fundamental price would be reasonable to stabilize the 'Bancor' prices for international buffer stocks (Bower and Kamel, 2003; Skidelsky, 2005; Ussher, 2012). However, Graham proposed that the ICC (International Commodity Control) under his plan would be responsible for buying and selling the commodity unit within a 10 percent price band. Kaldor put forward a much tighter spread between the buying and selling price of the ICC i.e. 4 percent as compared to Graham (Ussher, 2012). It has been argued that the price ranges suggested by Graham and Kaldor would be less attractive to speculators and middle men due to lower margin of profit. It would also help to avoid arbitrage operations (Ussher, 2012).

### *Price-Steps between Successive Price-Bands*

For adjusting the CRD's upper and lower points for a commodity, Grondona recommended 5 percent of the initial value as a reasonable figure for this parameter (Grondona, 1952; Grondona, 1975; Collins, 1985).

It is worth noting that the only role of discretion by government and/or central bank is in these decisions about the initial conditions – the selection of commodities to be included, the scale of operation with respect to each commodity (or grade), and administrative details such as minimum units of quantity to be handled, sites for storage facilities, and information dissemination.

### **Simulations of Conditional Currency Convertibility System for Turkey**

The authors performed simulations for each individual primary commodity to evaluate the Turkish CRD operations from the economic dimension. These simulations are based on monthly data and consider only specific grades of primary commodities imported by Turkey. These simulations also make the simplifying assumption that the operations of the CRD have no stabilizing effect on world market prices of primary commodities, and thus they overstate the scale of the CRD's purchases and sales, and accordingly its direct influence on the money supply to some extent. As a matter of fact, it can be anticipated that the CRD operations would have a significant stabilizing effect on prices of at least some commodities. Additionally, the selection of CRD's overall scale is somewhat arbitrary and therefore it could be increased (Collins, 1996; 1985). Further, it is also assumed that the monetary effects of CRD's operations would not be fully counteracted by the monetary authorities of the country (Collins, 1985).

The authors used annual data for the periods of 2005-2008 in order to develop the price schedules for Turkish primary imported commodities which were used to perform the simulations. The most recent commodity price data from 2009-2017, after adjusting them for inflation, were used to perform the simulations of the system's operations. The prices were compensated for inflation by using the average of the commodity metal price index and the non-fuel price index. The metal price index was used to adjust prices of Copper, Nickel, Lead, Tin, Zinc and Aluminium for inflation. Non-fuel price index values were used to adjust the prices of Wheat, Soybean, Coffee, Cocoa Beans, Maize (Corn) Seeds, Cotton, Barley and Rice in Husk. In addition, the authors used Grondona's (1975) suggested gearing of the

system for all simulations. However, in practice these values should be adjusted to match the requirements of each country implementing the system (Collins, 1985). The proposed values of parameters are shown in the following Table 4.

*Table 4.*  
Grondona's Proposed Values of Parameters

Parameters	Grondona's Suggested Values
Initial Index	Average of recent annual import prices (c.i.f) of primary imported commodities of respective country
Size of Price Band	+/-10 % of Initial Index
Block Size	10 % of annual average import quantity
Size of Price Step between Successive Price Bands	5 %

The authors carried out the simulations for all Turkish primary imported commodities based on the proposed gearing of the system as aforementioned. It was found from the results of simulation that the Turkish CRD acquired reserves of twelve commodities (namely Copper, Nickel, Lead, Tin, Zinc > 99%, Zinc < 99%, Aluminium, Wheat, Coffee, Barley, Maize (Corn) Seeds and Cotton) over the nine years of the simulation. The patterns of CRD's activity can be seen in Figure 2, which shows the monthly level of reserves for each Turkish primary commodity along with their respective monthly prices.

For example, the comparison of Nickel prices with its number of blocks shows that the drop in Nickel prices (as compared to the CRD's official buying prices) during early 2009 caused an increase in reserves of Nickel in the Turkish CRD. The price hikes during 2010 and 2011 reduced the Turkish CRD's nickel reserves. The same relation is evident from the graphs of other commodities reserves and their individual prices as shown in Figure 2.

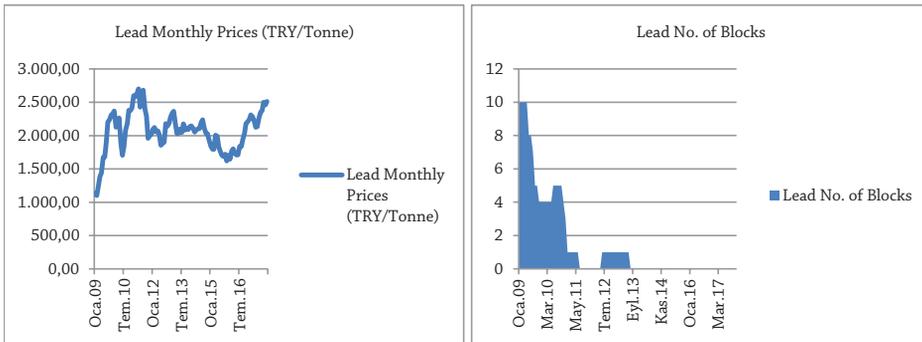
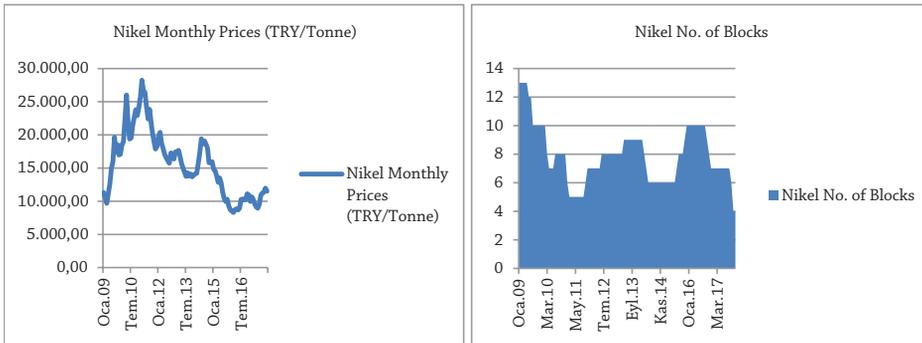
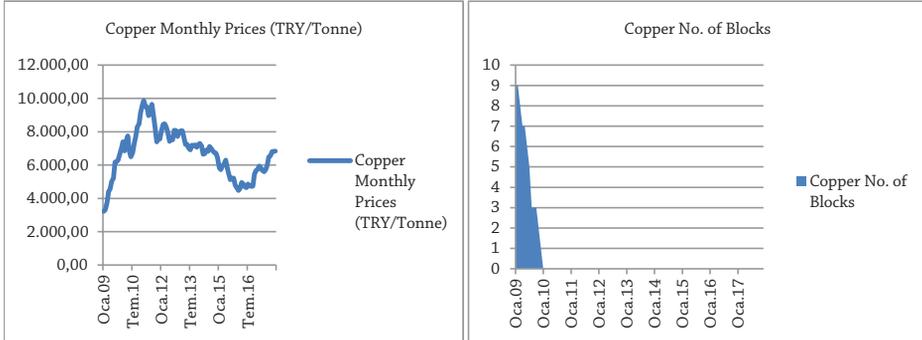
Overall, the graphs of commodity prices mostly show a sharp rise at the start of the period, representing the recovery after the U.S. sub-prime crisis which spread

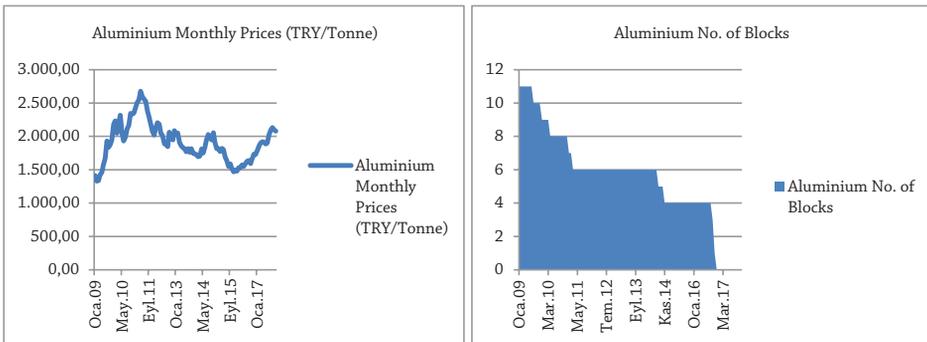
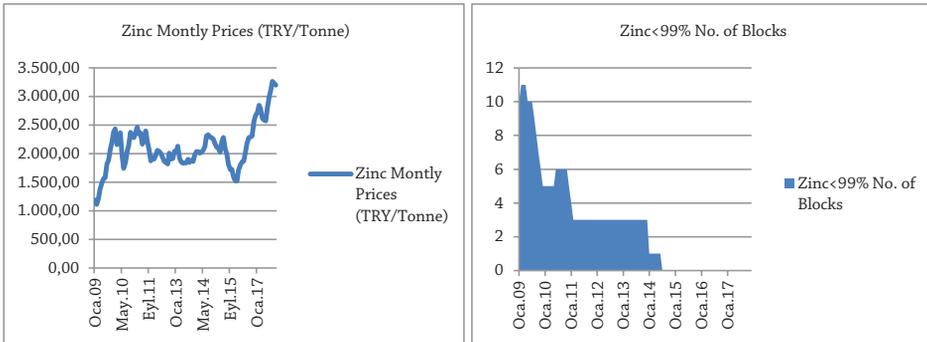
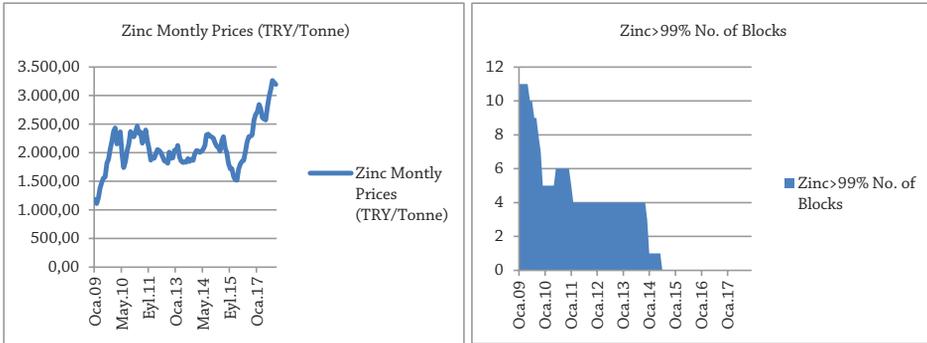
through the world financial markets. As a result, CRD's reserves mostly fell sharply at the start and in some cases did not recover. This illustrates the importance of the timing of the implementation of the system; if possible, it would be optimal to implement before a downturn in commodity markets. It is also worth noting that the wide fluctuations in commodity prices over the period; rises of 100% or more in most commodities, and even 200% in some cases – are due to instability both in commodity prices and in the Lira exchange-rate. This strongly suggests that the function of the CRD is very much warranted.

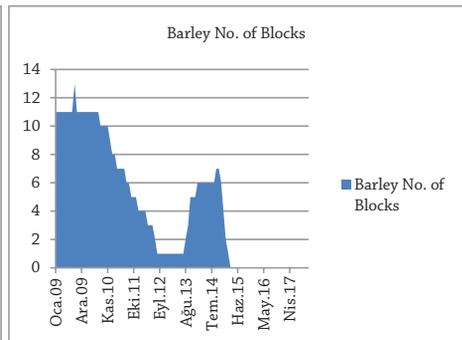
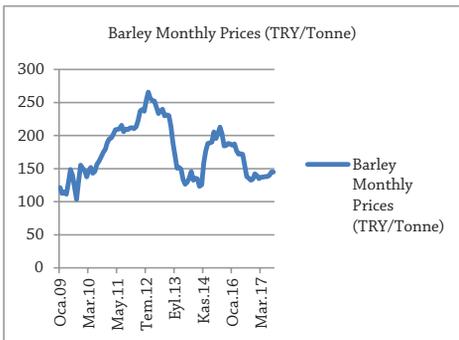
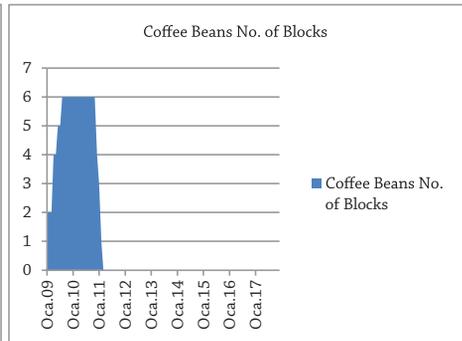
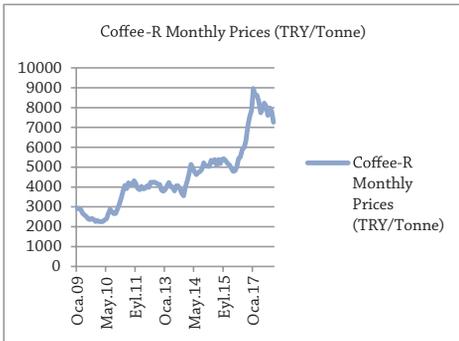
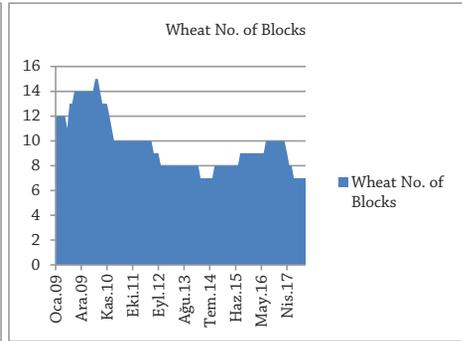
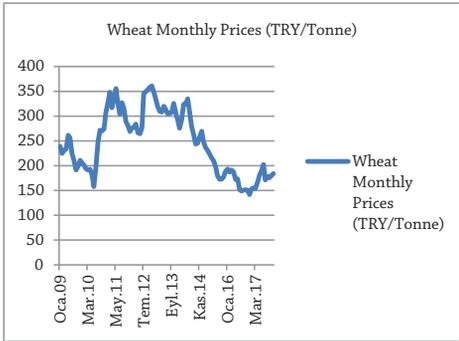
Table 5 illustrates the price schedule for Nickel used by the Turkish CRD. It shows the buying and selling prices offered by the Turkish CRD. It also provides information about the quantity of Nickel reserves available in Turkish CRD at any given price level. The official prices of Nickel would adjust in proportion to the level of reserves with the Turkish CRD as shown in Table 5.

*Table 4.*  
Grondona's Proposed Values of Parameters

Lower Points (TRY/Tonne)	Upper Points (TRY/Tonne)	Quantity in Turkish CRD Reserves (Tonnes)	Number of Blocks
46,374	56,679	0-350	1
44,055	53,845	350-700	2
41,736	51,011	700-1,050	3
39,418	48,177	1,050-1,400	4
37,099	45,343	1,400-1,750	5
34,780	42,509	1,750-2,100	6
32,462	39,675	2,100-2,450	7
30,143	36,675	2,450-2,800	8
27,824	34,007	2,800-3,150	9
25,506	31,173	3,150-3,500	10
23,187	28,340	3,500-3,850	11
20,868	25,506	3,850-4,200	12
18,550	22,672	4,200-4,550	13
16,231	19,838	4,550-4,900	14
13,912	17,004	4,900-5,250	15







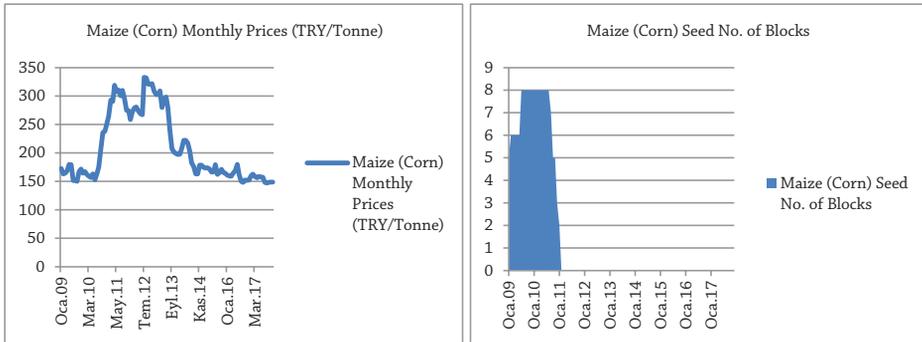


Figure 2. Monthly Market Prices and Level of Reserves of Turkish Primary Imported Commodities

The simulation results of Turkish primary commodities, shown above in Figure 2, clearly show the negative correlation between the prices of commodities and the number of blocks of commodities stockpiled by the Turkish CRD. Such an inverse relation shows the operation of the Turkish CRD in stockpiling reserves of primary commodities when commodity prices fall (slump period) and releasing those reserves when commodity prices rise (boom period). This helps to stabilize the prices of primary commodities by easing the pressure on primary commodity markets during both slump and boom periods. By this, it enhances the regularity of stockpiling of primary commodities over their price cycles. However, the extent of such an impact would depend on the scale of the Turkish CRD, the values of the parameters chosen, and the way in which the monetary authorities respond to transactions of the CRD - if at all (Collins, 1985).

**Financial Flows Resulting from Turkish CRD Transactions**

The similar pattern of monetary effects caused by transactions of the Turkish CRD can be observed from the following graphs. The graphs in Figure 3 show that the Turkish CRD buys reserves of Nickel and Barley during early 2009 due to the initial gearing. The purchase of these two primary commodities expands the Turkish money supply by 148 million Turkish Lira in the case of Nickel, and 36 million Turkish Lira in the case of Barley. On the other hand, it releases reserves of both primary commodities over the coming years as a result of the increase in their individual monthly market prices, which causes consequent reduction in the Turkish money supply.

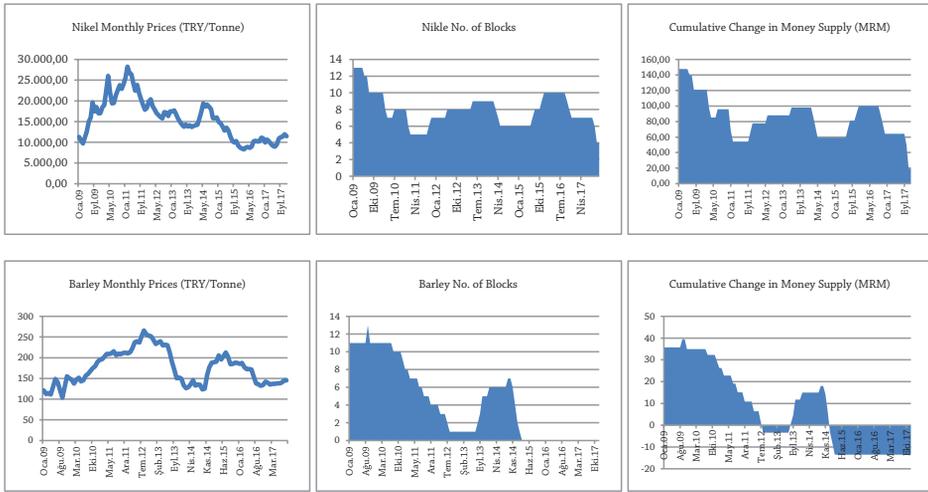


Figure 3. Changes in Money Supply Caused by the Turkish CRD Transactions

The Turkish CRD stockpiled reserves of twelve (12) primary commodities during the period of nine years i.e. 2009-2017. As result of its transactions, it caused changes in the money supply of Turkey on a quarterly basis as shown in Figure 4.

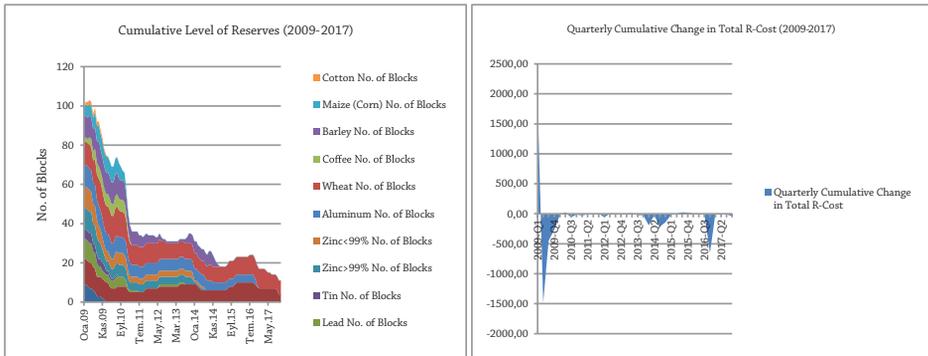


Figure 4. Collective Level of Reserves of Turkish CRD and its CRD's influence on Monetary Base

The overall pattern of financial flows resulting from the CRD's operation will be to disburse Turkish Lira abroad at times of falling commodities prices, and to withdraw Lira from the domestic economy (which would otherwise flow abroad) at

times of rising commodity prices. These flows would tend to reduce fluctuations in the costs of domestic users of commodities, in the incomes of foreign commodity producers, and secondarily in the demand for exports from Turkey.

## Conclusion

In response to the growing injustice and instability of the existing monetary system, countries must move to implement policies to insulate themselves against the worst effects of the current system. Stabilizing the real value of the national currency in terms of durable, essential, basic imported commodities, and thereby providing conditional, stabilizing support for world commodity prices is a particularly beneficial way<sup>1</sup> of stabilizing trade and economic growth (Collins, 2006). The Grondona system is the one of the proposals that has been recognized by a number of leading thinkers (for example, Professor Lord Nicholas Kaldor cited in Grondona, 1975, p.15; Sir Roy Harrod cited in Grondona, 1975, p. 9), because it provides a *practical* means of achieving this sort of stability to some extent.

The current study performed simulations to examine the economic effects of implementing the system in Turkey. The above graphs show how movements of the level of reserves of primary commodities (due to changes in their market prices) have a corresponding direct effect on the national money supply of the implementing country. The patterns of these changes have stabilising effects on a range of other economic indicators of the country.

The results of the simulations show how the Turkish CRD stockpiles reserves of primary imported commodities as a result of a drop in primary commodity prices, and releases those reserves during periods of price hikes, thereby helping to stabilise the prices of primary commodities and lessen the fluctuations in primary commodity markets over the cycle. The illustrated operations of the Turkish CRD also demonstrate its automatic mechanism in response to commodity market price movements. Avoiding the need for discretionary decisions by the monetary authorities in this way protects the system from distortion under existing monetary rules.

The simulation used historical data for the initial conditions: thus it may be assumed that the operations of a CRD would be rather more effective in practice by using more recent data for development of the price schedules, as proposed by Grondona (1975) and Collins (1985). However, continuing inflation in the host

country will lead to loss of reserves again, even if world market prices are not rising. This can be partially compensated by Grondona's proposed remedy to raise the CRD's prices after a prescribed period of no reserves (Gondona, 1975). However, rapid inflation of about 10% per year or more would considerably reduce a CRD's beneficial influence.

It was also evident from the graphs that the Turkish CRD stockpiled reserves of twelve primary commodities during the period 2009-2017 and caused corresponding change in Turkish money supply. The transactions of a Turkish CRD would cause corresponding changes in the domestic money supply, as clearly shown in the graphs depicting the monetary impact of Turkish CRD transactions, due to increases or decreases in monthly market prices of primary commodities. That is, the Turkish CRD expanded the money supply when there was a fall in the prices of primary commodities and contracted the money supply when the prices of primary commodities rose. A similar pattern of monetary effects would be observed from the transactions of several OIC countries' CRDs, if they were implemented; their collective stabilizing effects would be magnified. The simplicity of this simulation is also worth noting; the results do not depend on a macro-economic model or other theory, but merely on predictable market reactions to price-movements. Consequently the Turkish government can be confident of obtaining the benefits of the economic stabilizing influences illustrated.

Finally, a CRD would have helped to defend the Lira against the USA's recent attack which cut its exchange-rate by some 50%: as the value of the CRD's Lira selling prices (upper points) fell expressed in other currencies, traders would have bought more and more reserves from the CRD, thereby generating profits for the CRD and reducing the Lira money supply. At the same time these activities would have created market demand for the Lira needed to purchase reserves from the CRD. This is particularly valuable during a market "panic" in helping to prevent a "one-way" market of people only selling the currency. Turkish users of the imported commodities would also have benefited from being able to purchase reserves at prices below the levels to which they would have risen in the absence of the CRD. Furthermore, as the Lira regains its earlier value, the CRD will benefit through reacquiring reserves at prices below those at which they were sold during the earlier rapid fall in the Lira exchange-rate. Hence, in view of these potential benefits it would seem desirable to perform a detailed feasibility study of implementing a Turkish CRD, based on up-to-date information.

## References

- Ahmed, J. (2015, December). Application of the Grondona System in Selected OIC Countries: Justification, Simulation, Feasibility and Evaluation from Shariah Perspective. International Islamic University Malaysia, Malaysia. Retrieved from <https://lib.iium.edu.my/mom/services/mom/document/getFile/oneh-1gXujxSsPD2dCErExSuLFshT4VDy20160309163205756>
- Ahmed, J., Meera, A. K. M., & Collins, P. (2014). An Analysis of Yusuf (AS)'s Counter-Cyclical Principle and its Implementation in the Modern World. *Tazkia Islamic Finance and Business Review*, 7(2). Retrieved from <http://www.tifbr-tazkia.org/index.php/TIFBR/article/view/13>
- Ahmed, J., Meera, A. K. M., Collins, P., & Saleem, M. (2018). Analysis of Commodity Reserve Currency System from Siyasa Shariyyah Perspective. *Journal of Islamic Accounting and Business Research*. 9(2).
- Brown, E. H., & Simpson, R. (2012). *Web of Debt: The Shocking Truth about Our Money System and How We Can Break Free* (5<sup>th</sup> Revised ed.). Baton Rouge, La: Third Millennium Press.
- Candar, C. (2017, January 13). Turkey faces financial disaster. Al-Monitor. Retrieved from <http://www.al-monitor.com/pulse/originals/2017/01/turkey-economy-in-financial-collapse-haunting-erdogan.html>
- Çetin, S., & Gallo, A. (2012). THE Turkish Economy And The Global Crisis. *International Business: Research, Teaching and Practice*, 6(2).
- Collins, P. (2006, Spring). *Conditional Currency Convertibility and its Applicability in Japan*. Paper presented at Conference on Monetary Economics organized by Japan Society for Monetary Economics, Tokyo.
- El Diwany, Tarek. (2009). Transition Issues in Monetary Reform. In A. K. M. Meera (Ed.), *Real Money: Money and payment systems from an Islamic perspective* (pp. 119 – 189). Malaysia: IIUM Press.
- Collins, P. (1985). *Currency Convertibility: The Return to Sound Money*. New York, NY: St. Martin's Press.
- Graham, B. (1937). *Storage and Stability*, New York: McGraw-Hill.
- Greco, T.H. (2009). *The End of Money and the Future of Civilization*, White River Junction, Vermont: Chelsea Green Publishing.

- Grondona, L. (1950, July 21). Insurance Against Slump: A Way to Price Stability. The Manchester Guardian.
- Grondona, L.S.C. (1952). *A System for Commodity-Price Stabilization*, London: Economic Research Council.
- Grondona, L. (1958). *Utilising World Abundance*. London: George Allen and Unwin.
- Grondona, L. (1962). *A Firm Foundation for Economy*. London: Anthony Blond.
- Grondona, L. (1964). *A Built-in Stabiliser for Commodities*. London: Westminster Bank Review.
- Grondona, L. (1972). *A Built-in Basic Economy Stabiliser*. London: Economic Research Council.
- Grondona, L. (1975). *Economic Stability is Attainable*. London: Hutchinson-Benham.
- Hart, A.G., Kaldor, N. and Tinbergen, J. (1964). "The Case for an International Commodity Reserve Currency". Geneva: United Nations Conference on Trade and Development.
- Hoppe, H.H. (1994). How is Fiat Money Possible? – or, The Devolution of Money and Credit. *The Review of Austrian Economics*, 7(2), 49-74.
- Keynes, J. (1938). The Policy of Government Storage of Foodstuffs and Raw Materials. *Economic Journal*, 48(191), 449-60.
- Lietaer, B. (2001). *The Future of Money: Creating new wealth, work and a wiser world*, London: Century.
- McNamara, P. (2017, January 9). Turkey: the crisis candidate. Financial Times. Retrieved from <https://www.ft.com/content/eb841274-d406-11e6-b06b-680c49b4b4c0>
- Meera, A.K.M. and Aziz, H. A. (2002). *The Islamic Gold Dinar: Socio-economic Perspectives*. Paper presented at Conference on Stable and Just Global Monetary System: Viability of the Islamic Dinar, Kuala Lumpur: IIUM Press.
- Positive Money. (n.d.). Retrieved January 21, 2018 from <http://positivemoney.org/>
- Public Banking Institute. (n.d.). Retrieved February 4, 2018 from <http://www.publicbankinginstitute.org/>

- Still, W. T. (1996). *The Money Masters* (1996) - IMDb. Retrieved from <http://www.imdb.com/title/tt1954955/>
- Usmani, M. T. (2001). *The Text of the Historic Judgement on Riba 23 December 1999*. Petaling Jaya, Malaysia: Percetakan Zafar Sdn Bhd.
- Ussher, L.J. (2011). *Kaldor's Commodity Reserve Currency*. Retrieved May 30, 2013 from [http://www.qc-econ-bba.org/seminarpapers/leanne\\_figss.pdf](http://www.qc-econ-bba.org/seminarpapers/leanne_figss.pdf)
- Ussher, L.J. (2012). *Combining International Monetary Reform with Commodity Buffer Stocks: Keynes, Graham and Kaldor*. Retrieved May 30, 2013 from [http://www.global-systems-science.org/wp-content/uploads/2012/11/ussher\\_Bancor\\_19Dec12.pdf](http://www.global-systems-science.org/wp-content/uploads/2012/11/ussher_Bancor_19Dec12.pdf)
- Wheatley, J. (2017, December 14). Turkey's currency and bonds hit after modest rate rise. Retrieved January 22, 2018 from <https://www.ft.com/content/84c813fa-e0d5-11e7-8f9f-de1c2175f5ce>
- Zarlenga, S. A. (2002). *The Lost Science of Money: The Mythology of Money, The Story of Power* (1<sup>st</sup> Edition). Valatie, NY: American Monetary Institute.

