

## Identify the Wholesale Prices Changes and Price Cycles of Agricultural Products (Case Study: Meat and Eggs)

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(Received: 08 January 2015; accepted: 24 March 2015)

Identify the exact timing of price changes is essential for planners in providing these products and control market prices and it is essential for farmers and producers because awareness of the effects of price changes can be selected to optimize production and supply of products at the right time plan. In this study, we Identify the seasonal and month Wholesale prices changes of Agricultural Products (Case Study: Meat and Eggs) and we identify number of price cycles of them by using harmonic analysis approach. Monthly statistics used include wholesale price of meat and eggs in central Tehran Times Square during in 72-month period (April 2008 to Persian date February 2013), respectively. In order to study the fluctuations in the price of meat and eggs product, information on the wholesale price of in Times Square in central Tehran in March 2008 to Persian date February 2013 period were analyzed. The results show that the wholesale price of eggs in the market cycle in central Tehran is, respectively, 36 and 18 months. The wholesale price of chicken meat in the market cycle in central Tehran is, respectively, 72,18 and 14.4 months. The wholesale price of beef in the market cycle in central Tehran is, respectively, 36 and 14.4 months. The wholesale price of lamb meat in the market cycle in central Tehran is, respectively, 14.4 and 12 months.

**Key words:** Wholesale prices, seasonal prices changes , month prices changes, price cycles, harmonic analysis., Agricultural Products.

Production and supply of agricultural products due to some properties, such as dependence on weather conditions, seasonality of production and storage and transport conditions have a high volatility in comparison with other sectors. Given the role of agriculture in food supply, changes in the supply and prices of these products undesirable effects on food security and access to adequate food and good people make. various policies adopted by the government to balance the market of agricultural products and protection of consumers and producers . identify the exact

timing of price changes is essential for planners in providing these products and control market prices and it is essential for farmers and producers because awareness of the effects of price changes can be selected to optimize production and supply of products at the right time plan. the effects of price changes products such as chicken, beef, lamb and eggs have been selected in this research. The importance of this study is that it can identify the number of cycles price of the product and the exact time of the start of this cycles.

### **Literature review**

#### **In this context we mention the following nodes**

Shahnushi *et al* (2012) examined the time series of fluctuations in the price of corn price cycle by using harmonic method and Auto Regression Model anisotropy conditional

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variance. Harmonic analysis results indicate that 21-month-long cycle in corn prices in the period under review. Auto Regression model results showed that the conditional variance anisotropy factors disturbing little part in creating the conditional variance in the price of corn, the price volatility of corn prices will exacerbate. Ya ali Jahromi et al (2009) examined the forecasting model to predict the nominal and real price of beet and understanding during the years 1971-2005. Auto Regression models used to predict patterns include moving average, Auto Regression integration, moving average, exponential adjustment only, modified double exponential, harmonic and Auto Regression was conditional variance anisotropy. The results showed that, based on the minimum error of prediction of the models used, the harmonic pattern is compared with other models with fewer errors.

Farajzadeh and Shah Wali (2008), began to predict the nominal and real price of agricultural products, including cotton, saffron and rice for the period 1971-2005. The results showed that the lowest standard error of prediction, Auto Regression model integration, and saffron rice nominal price series can be predicted better than the other methods. Also the best predictions for the series of nominal and real price of cotton are harmonics and artificial neural network models.

Moghaddasi and Bakhshi (2008), using the traditional method of harmonic analysis began to examine seasonal fluctuations in prices of potatoes and onions. The results showed that the wholesale prices of potato has 5 and 9 and 15 months cycles, wholesale prices of onions crop has 12 and 18 months cycles. The wholesale prices of both potato and onion prices peak in early April (cycle time) and the lowest value was about September. Spared (2004), to determine the wholesale prices of potatoes and onions in the coming years, estimate a time series model to forecast the monthly price of the products at the wholesale level for the period from 1990 to 1999 years and that the increase the price of onions, potatoes compared to prices in the future will have more severe and more severe seasonal fluctuations.

Amin and Razzaque (2011)), who studied the volatility of agricultural prices and macroeconomic factors in Greece using the GARCH model. The results showed that there is a significant

positive relationship between macroeconomic policy and the volatility of agricultural prices Which represents the uncertainty in the market and looking for the manufacturer's decision problem. Thus the need for government intervention, inevitably the allocation of funds for investment in this sector.

Doran and Quilkey (1972), began a study to examine some important properties of harmonic analysis of quarterly data. It has two important properties of the asymptotic efficiency of the ordinary least squares estimators and orthogonal explanatory variables described. Following the method proposed for estimating the seasonal component and to determine the significance of coefficients test patterns provided. They are also used harmonic analysis method of the monthly data from the retail and wholesale of rice in Australia.

Waugh and Miller (1970), looked at the price and value of the catch of four fish species in Canada. They used harmonic analysis to the measured length of the cycle and the price of fish. The results showed that there is a cycle of 12 months, three and five year time in periods studied.

## MATERIALS AND METHODS

Harmonic analysis is the branch of science that is used to display mathematical functions or signals as the sum of the initial waves. The variables that comprise the fundamental wave are called harmonics. In fact, this method can be expressed in terms of the observed variable as a function Sin and Cos. Before the application of harmonic analysis to analyze seasonal fluctuations of a variable can be eliminated from the process data. However, when analyzing the data obtained with the data of the coefficients of the variables will be the same harmonic components. The presence or absence of trend data do not affect the coefficients of the variables Sin and Cos. Harmonic model is defined as a variable that is used to estimate the seasonal component of its views in the form of monthly data and deleted data. Harmonic model is defined as follows:

$$Y_t = \alpha_0 + \alpha_1 \sin(\lambda t) + \beta_1 \cos(\lambda t) + u_t \quad \dots(2)$$

Where:

$$\lambda = \frac{2k\pi}{P}$$

ut: is disturbing part that the variable is stationary.  
K: is number of variable frequency during the year,  
P: is cycle time,  $\alpha$  and  $\beta$  are the harmonic coefficients. If we assume that the data trend, the above equation can be written as follows:

$$Y_t = \alpha_0 + \alpha_1 \sin(\lambda_t) + \beta_1 \cos(\lambda_t) + \gamma_t + u_t \quad \dots(3)$$

$\gamma_t$ : is the trend. Given that the data used in the study are monthly, so in one year (12 month) period can be from one to 12 months. For example,  $k = 1$  means that during a period of periodic (with period of 12 months) and  $k = 6$ , we show that within a year, or about 6 alternates every two months we alternate. The data used in this research is related to the number of  $m$ ,  $n$  is the total number of observations:

$$T=1,2,3,4,n \quad n=12*m$$

According to the above equations in a single 12-month period (a period of) harmonic function is as follows:

$$\frac{2k\pi}{P} = \frac{2*1*180}{12} = 30 = \lambda \Rightarrow k=1$$

In this case:

$$Y_t = \alpha_0 + \alpha_1 \sin(30t) + \beta_1 \cos(30t) + u_t \quad \dots(4)$$

$t$ : number of months is desired. In the current study,  $t$  varies from one to 60.  $\cos(30t)$  means cosine an angle of 30 degrees. Doran and Quilkey suggests that a systematic method for the estimated equation (2) is that the first six harmonics (frequency) of the model are considered, then the variables in the explanatory power of the model is a significant contribution not be deleted (Doran and Quilkey, 1972).

The data used in this study consists of monthly data from March 2008 to Persian date February 2012, which the Office of the Ministry of Agriculture Vegetables gathered. The wholesale price of meat and eggs in Times Square in downtown Tehran. Nominal prices using the wholesale price index of all commodities in the country have been converted to real values. Due to the lack of wholesale price index of agricultural products, using the wholesale price index of all commodities in the country.

Based on previous research, data seasonally adjusted, resulting in a better understanding of the changes that took place over a period of time and without loss of seasonal changes, reflect the real economy, It is often used

in economic research and analysis adjusted for fluctuations in the data.

## RESULTS

In this study, we Investigate the price fluctuations of agricultural products using harmonic analysis approach (case study of meat and eggs). Monthly statistics used include wholesale price of meat and eggs in central Tehran Times Square during in 72-month period (April 2008 to Persian date February 2013), respectively. In order to study the fluctuations in the price of meat and eggs product, information on the wholesale price of in Times Square in central Tehran in March 2008 to Persian date February 2013 period were analyzed.

### Wholesale prices, eggs, poultry, beef meat and Lamb meat in different months during 2008 to 2013

#### Eggs Wholesale prices from April 2008 to March 2013

During the period studied, the average real price of eggs in the wholesale increased of 629 rials in April to 734 rials in March. However, the fluctuations can be seen in the example from April to May, the price increased of 629.3729 to 630.001 rials. And again from May to August the price reduced of 630.001 to 621.1886 rials. From August to September, the price increased of 621.1886 to 728.1095 rials. The price dropped again in October and again increased in December to 755.8309 to 714.3906 rials then decreased in December to 704.9161 Rial and then increasing trend continued until March (see Table 1).

#### Chicken meat Wholesale prices from April 2008 to March 2013

During the study period, the average real price of chicken at wholesale level decreased in April to 529.0154 rials in March. However, the fluctuations can be seen in the example from April to May, the price increase 540.0433 rials. And again dropped in June and July to 581.3586 to 533.9947 rials. From August to October continued the trend of decreasing prices increased again in November. In December and January the price dropped of 531.2196 to 495.5443 Rials. Then, in February and March increased (Table 1).

#### Beef meat Wholesale prices from April 2008 to March 2013

During the study period, the average real price of beef at the wholesale level of 2126.65 dollars in April increased to 2,176.662 rials in March. However, the fluctuations can be seen in the example from April to June the price of 2,126.65 rials fell to 2,012.566 Rials. And again increased in August to 2105.969 Rials. Then, increased again to March (Table 1).

#### **Lamb meat Wholesale prices from April 1387 to March 1392**

During the study period, the average real price of Lamb meat wholesale level increased in April as in March. However, the fluctuations can be seen in the example from April to July the price dropped of 2732.398 to 2596.235 rials. And again in July to August, then to November prices increased. From December to March the price increased of 2466.187 dollars to 7,284.2 dollars (Table 1).

#### **2013 Wholesale prices, eggs, poultry, beef meat and Lamb meat in different seasons during 2008**

The price of eggs has increased from spring to summer. In autumn, this price has increased, But dropped in the winter. The price of chicken has increased from spring to summer. In autumn the prices have decreased but increased in winter. The price of beef has increased from spring to summer. In the autumn the prices have fallen down in the winter. trend Lamb meat prices have fallen from spring to summer. In the autumn the prices have decreased, but increased again in winter (Table 2). The figures contained in this table is Egg prices fluctuated during different seasons of the year twice. Chicken meat prices fluctuated during different seasons of the year three times. Wholesale beef prices fluctuated during different seasons of the year twice. And Lamb meat wholesale prices fluctuated during different seasons of the year twice. Thus, during the study period, the wholesale price of chicken to the egg, Lamb meat and beef meat is a more seasonal fluctuations. The price of eggs from April to March period was 16.57 percent. Chicken meat price growth from April to March period was 6.53 percent. Beef price growth from April to March period was 2.35 percent. Lamb meat price growth from April to March period was 1.89 percent. Consider that during the study period, the wholesale price of chicken to eggs, mutton and beef have risen more sharply.

**Table 1.** Wholesale prices, eggs, poultry, beef meat and Lamb meat in different months during 2008 to 2013

March	February	January	December	November	October	September	August	July	June	May	April	Eggs chicken meat Beef meat Lamb meat
733.7187	701.4756	707.1291	704.9161	755.8309	714.3906	728.1095	621.1886	624.5392	629.0344	630.001	629.3729	
563.5838	560.1113	495.5443	511.5108	531.2196	504.5277	516.791	580.6202	581.3586	533.9947	540.0433	529.0154	
2176.662	2184.325	2064.643	2064.066	2061.468	2041.728	2069.03	2105.969	2078.067	2012.566	2046.131	2120.65	
7284.2	2738.147	2564.427	2466.187	2466.229	2467.45	2493.905	2612.016	2596.235	2601.852	2646.852	2732.398	

Reference: Bureau of Animal and Poultry and Grain and forage crops office in Ministry of Agriculture and Bureau of Statistics Central Bank

**Harmonic models****Eggs prices harmonic models**

We can estimate that the wholesale price of eggs in the market cycle in central Tehran is, respectively, 36 and 18 months. Based on a 36 month cycle the maximum wholesale price of eggs can be said that April is the start of the cycle and the wholesale price of eggs reaches its minimum value in september

**Chicken meat prices harmonic models**

we can estimate that the wholesale price of chicken meat in the market cycle in central Tehran is, respectively, 72, 18 and 14.4 months. Based on a 72 month cycle maximum wholesale price of chicken meat is in April and wholesale price of chicken meat reaches its minimum value in April. Based on a 18 month cycle maximum wholesale price of chicken meat is in November. And the wholesale price of chicken meat reaches its minimum value in December. Based on a 14.4 month cycle maximum wholesale price of chicken meat is in April and minimized in October.

**Beef prices harmonic models**

we can estimate that the wholesale price of beef in the market cycle in central Tehran is, respectively, 36 and 14.4 months. Based on 36 month cycle The maximum wholesale price of beef can be said that in April and minimized value in September.

**Based on 14.4 month cycle when the maximum wholesale price of beef in mid- May and minimized in October****Lamb meat prices harmonic model**

we can estimate that the wholesale price of lamb meat in the market cycle in central Tehran is, respectively, 14.4 and 12 months. Based on a 14.4 month cycle when the maximum in mid-June and minimized in in October.

Based on a 12 month cycle the maximum wholesale price of lamb meat is in June and minimized in September.

**Suggestions**

1. Knowing the minimum and maximum prices were to propose to the government the necessary facilities at the disposal of farmers groups and cooperatives, especially in major cities put Manufacturer. The surplus product to be transported over a supply shortage And the lowering of prices in the region due to high supply and rising prices due to the reduction in regional supply stop.
2. It is suggested with regard to the number of cycles the price for each product as well as the exact time of the start of this cycle are used as a tool to regulate the price of commodities in the wholesale market.
3. Using the Harmonic analysis can be

**Table 2.** Wholesale prices, eggs, poultry, beef meat and Lamb meat in different seasons during 2008 to 2013

Winter	Autumn	Summer	Spring	
714.1087	725.0459	657.9458	629.5052	Eggs
539.7465	515.7527	559.5899	534.3511	chicken meat
2141.684	2049.946	2084.355	2061.782	Beef meat
2695.591	2466.622	2567.385	2660.118	Lamb meat

Reference: Bureau of Animal and Poultry and Grain and forage crops office in Ministry of Agriculture and Bureau of Statistics Central Bank

determined at what time of year, there is a price for the product. In fact, knowing the cyclic patterns of agricultural prices in order to determine the price in time and to stabilize the prices of these products are effective. Therefore, it is suggested that if the government seeks to stabilize the price at the time or a specified period, the application of harmonic analysis will help in this regard.

4. If the imported agricultural products (particularly in the case of beef and mutton) can be used harmonic analysis, to determine the time of import. This means that by knowing the maximum price of the products in the domestic market, they have to import, followed by tariffs on imports of the product in question is at least and when the price of the products in the domestic market is minimized, Imports of these products



- reduced the maximum tariff.
5. Iran is the recipient of world prices and the value is not effective, but to improve the quality of domestic products can compete with foreign prices is created. This country could be the result of bargaining on sectoral tariff rate is effective And thus can control the price fluctuations in the correct direction this is necessary to avoid cronyism in tariff policy and systematic approach to the topic of pricing. The long-term strategy must be based on the fluctuations in the rate of the resort and sometimes political reasons should be avoided.
  6. By moving towards development, many of the problems of inefficient infrastructure (one of the causes of price volatility), not only in the agriculture sector in most parts of the country, will be resolved and that the policy principles, rational, legal and away from the individual decisions will be possible.
  7. Since the main goal of an economic community, the allocation of resources among members of the community to maximize prosperity. To achieve this goal, need to be allocated in such a way that the highest source of income for the community. This is a free market economy is done through prices. In other words, prices have to determine what and how much and how products are produced. Even the price is determining to whom the products must be produced..The prices of the economy have a major role in a wide range of territory. The prices are effective income distribution, factor productivity and creating incentives for capital. Therefore fluctuations at different times can easily cause the pattern to be considered. Especially when these fluctuations are random changes. The issue price fluctuations would cause the application of some of the techniques of production planning difficult or impossible. However, using the harmonic analysis can be used with acceptable accuracy changes and price fluctuations in the future in order to achieve the above objectives predict.
  8. In this study, to assess the real fluctuation

of prices has been adjusted Given that there is a common trend in nominal values than their actual values. Therefore, it is desirable that decisions be made based on the amounts provided for nominal prices.

### ACKNOWLEDGEMENTS

This paper is extracted from a research project entitled : Investigate the Price Fluctuations of Agricultural Products Using Harmonic Analysis a Approach (Case Study of Meat and Eggs). , that this project is sponsored by the Islamic Azad University of Neyshabur in Iran. So be sure to thank of Vice President and all staff of university research for their sincere cooperation.

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