DETERMINANTS OF WORLD COTTON PRICE DOES MARKET CLEAR

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ABSTRACT

Primary commodities play a vital role in world economies. Most of the developing countries are dependent on agricultural primary commodities. Cotton is one of the most important agricultural primary commodities because of its great importance incorporating with human needs. Since the textile industry does not need too much foreign investment and high technology, LDCs can increase their GNP by textile industry investments. Cotton traded in raw form as well as textile manufacture form. Thus in global context it is crucial to estimate the price dynamics of cotton. In this study we will try to estimate the main determinants of cotton in world to ensure that whether market clear or not in price determination process.

Keywords: Primary commodities, market model, cotton price

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DÜNYA'DA PAMUK FİYATININ BELİRLEYİCİLERİ PİYASA MODELİ UYGULAMASI

ÖZ

Birincil mallar Dünya ekonomik düzeninde önemli bir yer tutar. Pek çok gelişmekte olan ülke tarımsal birincil ürün üretimine bağımlı durumdadır. İnsan ihtiyaçlarını giderme özelliği nedeni ile pamuk bu tür ürünler arasında öncelikli öneme sahiptir. Tekstil sektörü yüksek teknoloji ve yabancı sermaye ihtiyacı duymadığı için gelişmekte olan ülkeler milli gelirlerini bu yatırımlarla arttırabilirler. Pamuk Dünya üzerinde ham ve işlenmiş tekstil ürünü olarak yüksek miktarda ticari işleme sahiptir. Bu nedenle pamuk fiyatlarının öngörülmesi oldukça önemlidir. Bu çalışmada piyasa modeli çerçevesinde pamuk fiyatlarını belirleyen başlıca faktörlerin etkisi incelenerek piyasanın fiyat belirleme gücü tartışılacaktır. Bu kapsamda W.C. Labbys tarafından geliştirilen ve tarımsal birincil mallar için kullanılan piyasa modeli kullanılacaktır. Bu model ile piyasa güçlerinin zaman serisi analizinde Dünya pamuk fiyatlarını belirleme etkisi araştırılak geçerliliğ tartışılacaktır. Böylece arz ve talep başta olmak üzere modeldeki piyasa güçlerinin piyasa ölçeğinde pamuk fiyatlarını belirleme etkisi araştırılacaktır.

Anahtar Kelimeler: Birincil mallar, piyasa modeli, pamuk fiyatı

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Introduction

Cotton is one of the most important agricultural commodities in all primary commodities. Usually it is counted under the multifibre agricultural products. Because of increase in population in world and the increasing importance of cotton in the fashion industry, the demand for cotton increased smoothly over time. Most of the cotton is produced from seed which is planted annually. So after the planting the production level cannot be changed until the next year. Cotton is grown mainly in three zones in world, North zone, Ecuador zone and South zone. Most of the cotton is grown in north zone. The world's largest producers of cotton are USA, Turkish Republics (Azerbaijan, Uzbekistan, Turkmenistan, Kirghizstan, Kazakhstan) and China, In the first part of our study main determinants of cotton price in general level explained. The demand for cotton mainly consists from textile industries demand. Because of increasing population in world and changes in fashion the demand for textiles and also cotton are accelerating. In supply side there are several factors. The production of cotton in the world is the main factor. New techniques for cotton production and more effective techniques for pest control are improving quality and quantity of cotton grown. In supply side also the government intervention and current political and economic environment affect price of cotton. Unstable political and economic environment in countries and high government intervention creates some distortions in price determination. In this paper after evaluating the theoretical framework for I will clarify the price determination process of cotton in global context.

2.Cotton As a Primary Commodity

Primary commodities, are commodities such as foodstuffs and raw materials and their supply is mainly made by agriculture or mining. The importance of primary commodities is twofold. First, primary commodities continue to constitute the core of the GDP and trade in a great number of LDCs, since many of them depend to very large extent on their exports of these products. Changes in the prices of these commodities affect the economic structure of these countries (Sapsford,1994). Secondly, agricultural commodities especially are a key source of human food and clothing. In order to survive in the world, people need these foodstuffs and raw materials for textile industry. Commodity prices are one of the most important determinants of the world's economic performance. They influence the stability of LCDs incomes and industrial countries inflation and world investment and growth. The economic importance of primary commodities on growth path reshapes power and governance in developing countries

(Sapsford,1996). So the relation between market mechanism and price level for those commodities means much more in most part of the world.

Cotton is one of the most important agricultural commodities in all primary commodities. Usually it is counted under the multi-fiber agricultural products. Because of increase in population in world and the increasing importance of cotton in the fashion industry, the demand for cotton increased smoothly over time. Cotton is a vegetable fiber composed mainly of natural cellulose with a thin coating of wax. It is grown for the soft white downy fiber surrounding the seeds and for the oil within the seeds. The cotton fiber grows as a thin, hollow rube, and when ripe, collapses into a thin ribbon twisted about its own axis. After the cotton is harvested, the fiber is separated from the seed. Before transformation to the fabrics, there are number of stages a fiber must undergo. At first raw fibers are spun into continuous lengths of thread. Then spun threads are formed into fabric. In the finishing process the cloth is bleached, dyed or printed.

Fragments of cotton fabric and string found by archaeologists in ancient ruins at Mohenjo-Daro (the area today called Pakistan) indicate that cotton was known and used in the Indus Valley as long ago as 3000 BC. The use of cotton in India is recorded in religious books dating back to 800 BC. In fact India was the center of the world's cotton industry from 1500 BC until the beginning of the sixteenth century.

The word cotton comes from the medieval Arabic word Quttan or Kutn which means a plant found in conquered lands, a reference to Alexander the Great's conquest of India. Arabian caravans brought cotton to Europe from India during the middle Ages. It was the Industrial Revolution, however, that expanded the use of cotton. New machines were invented which speeded-up the production of yarn and cloth.

Until the early seventeenth century, wool was the main fiber in England. Cotton manufacture was first introduced in England from Holland by Protestant refugees towards the end of the sixteenth century. But gradually cotton manufacture began to spread as a cottage industry. The first cotton yarns were used in linen to make mixture cloths. The rapid growth of Manchester during the eighteen and nineteenth centuries owed a great deal to cotton trade. In the time handloom weaving gave way to power loom weaving, and the changeover from cottage industry to factory work was accomplished.

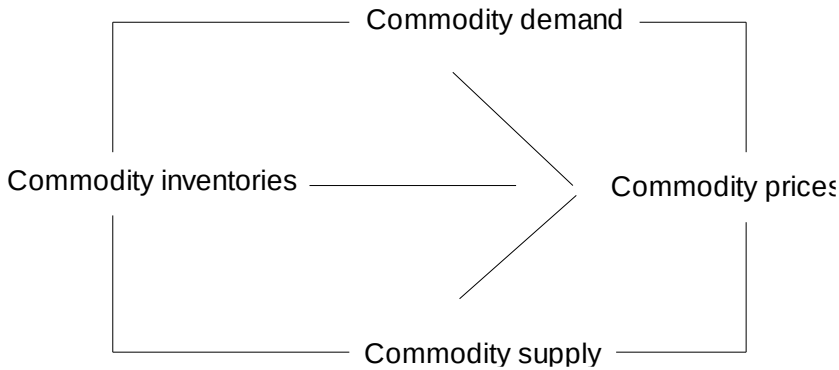
Beside the quantity of cotton produced, the quality of cotton is also important. Cotton fiber is classified in three ways, by its length, strength and uniformity. The fiber typically accounts for approximately 35 percent of the weight of seed cotton. The quality of cotton depends on the color and the length of staple. The longer the length of staple and the whiter the cotton, is the higher the quality. The highest quality of cotton is grown in Egypt.

Due to the importance in textile sector as a main input the price level of cotton plays a crucial role world. The producers in developing countries wish to maximize their revenues with higher price level. On the other side textile producers want to keep the price level in much more moderate levels in order to maintain low cost of production. Thus the price determination of cotton becomes a complex issue in international level in globalized world. Officially the global market price determined in Liverpool due to the historic background of city from 17th Century in textile manufacturing. Since the price level of cotton is such an important issue for both developing and developed world, there are some economic models produced to explain the main determinants of this agricultural primary commodity. In following part of our study we will provide some theoretical explanation for those models in order to draw specific attention on price determination of cotton.

3. The Structure of Commodity Models

Many commodity models have the same structure. Like all goods, the basic forces determining price of primary commodities are supply and demand. Although national tariffs and taxes can create differences, we are neglecting these facts by assuming the non-existence of any distortions and existence of pure competition. The primary commodity models have same components as demand, supply, inventories and price determination. The determinations of these components are going to be explained in following part.

We can roughly present the basic structure of commodity models with Figure 1.



The demand behavior of commodity basically depends on to prices and income, i.e. the associated price and income elasticitis. The price elasticity tends to be lower for commodities without close substitution. Also products with high income elasticity experience high demand fluctuations. These elasticities are time variable and depend on current supply and demand of market (Zamagni,1986).

The supply of commodities depends on biological, geological and technological nature of production process. The supply of agricultural commodities especially depends on climate and weather conditions. So in the short run, the supply does not become flexible for agricultural commodities and cannot adjust to the changes in price level because of the lags involved in production process. In the long run, the supply however adjusts more easily to the price changes than in the short run. One of the most important aspects of price determination in commodity models is the interrelation between inventory and price adjustments. Especially buffer stocks are very important element of commodity market in order to achieve stabilization. The demand for agricultural inventories hold because of seasonal and cyclical fluctuations in supply does not match variations in demand. So the level of inventories depends on the future supply and demand patterns (Adams , 1978).

In order to minimize the negative effects of unstable price and output structure of primary commodities, firms and governments try to estimate the future movement of primary commodities. In the case of the price of commodities, care has to be taken to the different price expressions. The future prices of commodities are affected by different factors Although there are many models explaining and reasoning the dynamics of price determination ın this paper we did use market based model In open market economies the price mechanism has strong relation with most of the market forces. Widespread use of commodity models reflects not only a

deeper understanding of the complexities of commodity markets but also helps us to measure the influence of economic and non- economic factors affecting these markets. Although models cannot explain everything to us, they would reduce the risks of investing, speculating and trading on these commodities.

A hierarchy of commodity market models can be visualized going from the very simplest, most highly aggregated system to increasingly complex disaggregated models. There are examples ranging from 'mini' models to more complex system ones. In order to avoid giving a very broad definition of many primary commodity models, in this research I have just briefly explain the main type of primary commodity models. They are mini, market, process, system dynamics and input-output models. The explanations of those models are behind the scope of this paper. So by considering the dynamics of price determination process under the global context we used market model in our research.

4. Market Models

The form of these commodity models commonly considered is one whose solution is reached through the equilibrium of a set of demand and supply conditions. By considering these market models individuals try to estimate the future movements of a primary commodity by evaluating historical data. This type of model also considers inventories in its calculations.

These models focus on price mechanism to clear the market. Although much complex model structures can be used, the main body of model consists of four equations. In these models demand is explained by prices, economic activity, prices of substitute commodities and technical factors. Supply of product depends on weather and geological conditions. Price is also explained by changes in inventories (Labys, 1984). Policy variable in these models capture the changes in economic policy in given country. Under liberalized policies, the price of primary commodities is determined by the commodity market whereas in less liberalized countries government intervention effects the determination of primary commodity prices.

$$D_t = d(D_{t-1}, P_{t,}^{\ e}, A_t, T_t) \qquad \text{Eq. (3.3)}$$

$$Q_t = q(Q_{t-1}, P_{t-\theta}, N_t, Z_t) \qquad (3.4)$$

$$P_t = p(P_{t-1}, \Delta I_t) \qquad (3.5)$$

$$I_t = I_{t-1} + Q_t - D_t \qquad (3.6)$$

Where:

I	Commodity Inventory
D:	Commodity demand
Q:	Commodity supply
P:	Commodity prices
Pe:	Price with lag distribution:
A:	Income level GNP
T:	Technological factors
N:	Agronomic or geologic factors
Z:	Policy variable influencing supply

The equations in this model can be considered separately by using OLS. If there is simultaneity between equations, it would be better to solve them by the Two Stage Least Squares method. In order to this we create reduced form equations. The reduced form provides a basis for analyzing model stability. The model then can be used to analyze policy questions through explanation or prediction.

These types of models are applicable to agriculture, energy and minerals. They are extensively used in real life for prediction of possible price movements of primary commodities. The market model is easy to apply especially for agricultural commodities. If we just interested in price determination in a raw commodity it performs very well. But the model cannot consider the related industry's derived demand for this commodity. The market model cannot be applied in sectorial or industrial basis. Because of its suitability for agricultural primary commodities, the market model can be easily applicable to cotton.

5.The Determinants of Cotton Price

As mentioned in every preliminary economics textbook the price of a product is determined by supply and demand for the product. The case of primary commodities, such as cotton, that evolution is not very helpful in explaining the determination of price. In this part, the determinants of cotton prices are explained under three sections. The price determination process is explained by the considering cotton demand and supply. In the first section, the demand for cotton from textile industries is explained by the demand side. In second section, we are going to see the supply side by considering cotton production, inventory and government intervention to cotton prices.

5.1.Importance of Textile Industries in Demand Side

Although cotton is used in different areas such as in the chemical and paper industries, it is mainly used in the textile sector (Olalı,1993). The increase in world population and changes in fashion are the most important sources of textile demand.

The world's population is now over 7 billion. The birth rate is still quite high. If this rate were to be maintained then world population would be over 11 billion in 2050 (National Geography, 2017). As we know, one of the most important basic needs of human is clothing. Thus increase in population would certainly increase the demand for textiles.

Fashion adds a lot of interest and excitement to our lives, but it also calls for a great deal of co-operation between the textile industry and the makers-up. Different clothes become popular, colors change in popularity from season to season, as do prints, and dyers and printers must constantly update their output if they are to sell their products. Sometimes a trend develops into a whole new life style.

Cotton passes through several processes in the textile industry. The making up operation consists of cutting, sewing, pressing, inspection and finishing. The sewing operation itself accounts for about 75% of the garment manufacture. There are two types of manufacturer in clothing industry; those who work under orders from other manufacturers or wholesalers and those who create their own work program and must follow closely and changes in fashion, anticipating the rise and fall in demand for their products. In brief, the change in fashion accelerates the demand for cotton.

Because of the factors mentioned above, cotton prices are heavily affected by the movements in the textile sector demand. In the long-run, the population growth and fashion changes will positively affect the demand for textiles. But in the short-run fluctuations in income level negatively affects textiles demand and creates deviations from long run.

In LDC's the textile industry has a long international history compared to others. Because industries initial appeal was based on following factors: Simple technological requirements, the reliance on local raw materials (mostly cotton), relatively modest capital requirements, and predominant labor intensive nature of production of production process.

After 1970s, the growth of synthetics produced in western countries was hit by the rise in energy prices. Thus the move of textile capacity from DCs to LDCs has continued. In LDCs, inequalities in the distribution of income have restricted the growth of demand for textiles, to rates below those in the west. These circumstances meant LDC producers had little choice but to put a high priority on exports of textile manufactures (Singer, 1977).

The global consumption culture increases brand loyalty and image for western companies. The marketing process and brand image of most of international textile brans build in western headquarters of those companies. Whereas most of the production process is subcontracted to less developed countries such as Pakistan exc. Absolute surplus value of production in developing world capitalized western developed countries. It means increase in fragility of textile producers in developing countries in economic crisis.

5.2.Determinants of Cotton Price by Supply Side

The other important factors affecting cotton prices in supply side are as follows:

5.2.1.Production of Cotton

Most of the world's cotton is produced from seed which is planted annually. A long, warm growing season is needed to obtain a good crop of cotton. Thus it is grown between latitudes 45 degrees north and 30 degrees south where 175-225 frost-free days a year can be expected. Sunshine is also important to stimulate early growth and ripen the mature bolls.

The supply of cotton depends on production per acre and the total area of production. The main underlying unforeseen determinant of cotton production is the effects of weather conditions. Weather conditions affect the production level and quality of cotton from planting to harvest.

Cotton needs over 20 inches of rain each year to promote healthy growth. However, it can be grown in areas with less rainfall by irrigating the land. Water for irrigation may come from a river which rises in a wetter area or it may come from below the ground from a well or bore-hole. Nowadays a lot of cotton is grown in what was once arid or semi-arid land, as in California and Sudan.

Improvement in cotton quality and better techniques for pest control are the other important elements effecting cotton supply. Both weed and pest control is very important to protect the growing cotton attacked by various insects. Cotton is vulnerable to more than 500 hundred species of insect pests which may, if uncontrolled, reduce the quantity and quality of the crop or even kill the plant. Diseases caused by fungi bacteria and viruses also attack the cotton plant, but in many countries these have been reduced by breeding resistant varieties of cotton. Weed control is also an essential part of the cotton farming operation. Not only do weeds compete with the young cotton plants for nutrients, water, light and space, they can also harbor pests, encourage disease, make irrigation difficult and hinder mechanical harvesting.

5.2.2 World Cotton Inventory

World cotton stocks are also another element affecting cotton price. Since cotton captures strategic importance for all countries, both supplier and user countries prefer to maintain minimum levels of cotton stocks for strategic reasons. The speculative nature of cotton also pushes textile manufacturers to maintain certain level of cotton stocks in order to hedge against the price change exposure. Textile economies in which governments pursue supply management policies tend to exhibit relatively high levels of ending stocks. Inventories are themselves a commodity whose size is determined by interest rates, storage charges, manufacturing needs and length of time to harvest, as well as delivery risks and speculation on price differences over time. Governments are naturally more risk averse than is private industry and under government supply management regimes, desired ending stocks have tended to be larger than necessary.

Thus the changes in cotton stocks as a whole affect the cotton prices. In some countries the stocks must be maintained in large amounts. For example, stocks

in China (Mainland) have climbed during the last decades under the auspices of the government's supply management program and now represent one year's worth of domestic use and nearly half of world stocks. Within the context of the Chinese economic system, large stocks are desirable as a hedge against shortages and disruptions in the distribution system and as a tool to dampen price fluctuations. Because interest is not charged on loans to state enterprises, including most textile mills and the Bureau of Cotton and Jute, stocks can be held at little cost (Townsend, 1997). So when world cotton stock remains at high levels, cotton prices will not have expected to increase in future. If because of some reason the cotton inventory declines, that will create expectation about cotton price increase.

5.2.3. Government Intervention

Government intervention usually affects cotton prices and plantation area. USA especially intervention in cotton prices remained along time after 1929. The liberalization wave in both politic and economic life in the 1970s has lessened the government intervention and has changed the way of intervention to direct to the indirect way. USA Government has started to use target price policy to intervene to the market. According to that policy the difference between intervention price and market price is paid directly to the farmers from Government funds. Government plans the planting area and cotton production by issuing securities to the farmers when they store their cotton in government warehouses. Also, the USA government is trying to plan cotton supply by giving training to farmers and launching different research programs for better quality of cotton.

Since the number of farmers in all population is low in developed countries, the ratio of funds used for government intervention to the GDP is very low. Whereas in developing countries the agricultural sector still captures important part of GDP and production planning is not much effective, the cost of intervention to the government is still too high. In Arab countries the financial cost of public support to agricultural is real burden for fiscal budget of countries.

5.2.4. Political and Economic Environment

The political and economic situation in main cotton producer countries also affects the price of cotton. For example huge trade deficits in Egypt may force this country to decrease the price of cotton in order to reduce the deficit by increasing exports. Also the factors such as, political stabilization, inflation rate, increase in GDP and unemployment rate in countries affects the price of cotton. The dismantling process of USSR ended up with sharp decline in cotton production and

quality in Turkic world. Also Arab revolt seems to effect the production volume in those countries.

6.Recent Global Trends in Cotton Price Determination

One of the main global phenomena in recent two decades was that whether market forces are eligible and powerful to interact with price determination process. If market forces are not effecting price determination process that means market does not clear for right price signals in market and price determination process biased and distorted by speculative attacks. Last twenty years most of the primary commodities have enormous price increases without supply and demand shocks. Thus classical role of supply and demand in price determination process has diminished in all matters.

Cotton price determined with Cotlook Index in Liverpool Cotton Exchange owing to the fact that city famous reputation during the colonial era for textiles industry. For more than a age price level of same quality cotton from all over the world gathered by Cotlook Index. Thus recent global movements in price can observed with that data. Cotton price increased in global level like all other primary commodities in world. In this paper we examined whether those movements are related with market forces of supply and demand. If that so we may conclude that market does clear prices in long term. In following part of the study we explained main findings of the application of market model to global cotton prices.

7.Conclusion

The classical economic theory draws special attention to supply and demand of certain good in price determination process. Producers and consumers of a commodity take decisions from the signals from the interaction of those two market forces since market price level is the main indicator where they intersect. Even though there are deviations from market conditions in short term, it is expected that in long term according to theory market clears and supposed to give right signals by price level. In this study we used Labys model in order to investigate the potential powers of market forces in price determination process. Application of market model to global cotton market reveals classical explanation of market forces theorem is not relevant for price determination process. In historical context we used Cotlook Index data set for our explanatory model. The equations aim to test the global cotton supply and demand effects on price level in long term. It is clearly relevant that price level both those market forces are mutually exclusive and market does not clear.

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Appendix

RESULTS OF UNIT ROOT TEST						
Variable	**Level**	**Model**	**Augmented Dickey- Fuller**		**Phillips-Perron**	
			ADF		**PP**	
			T-statistic	**Prob.**	**Adj. t-Statistic**	**Prob**
DEM	Level	Constant	-0.5627	0.862	-0.5627	0.862
DEM	First Difference	Constant	-5.5170*	0.000	-5.5170*	0.000
DEM	Level	Constant + Trend	-2.2921	0.423	-2.4178	0.362
DEM	First Difference	Constant + Trend	-5.3724*	0.001	-5.3725*	0.001
SUP	Level	Constant	-1.3191	0.604	-1.2511	0.635
SUP	First Difference	Constant	-4.5904*	0.001	-5.1193*	0.000
SUP	Level	Constant + Trend	-3.1558	0.116	-3.1140	0.125
SUP	First Difference	Constant + Trend	-4.4783*	0.008	-4.9915*	0.003
PRICE	Level	Constant	-2.3461	0.166	-2.3671	0.161
PRICE	First Difference	Constant	-4.8411*	0.001	-5.4581*	0.000
PRICE	Level	Constant + Trend	-2.4798	0.334	-2.4861	0.331
PRICE	First Difference	Constant + Trend	-4.7223*	0.005	-5.3436*	0.001
INC3	Level	Constant	0.3799	0.978	0.3593	0.977
INC3	First Difference	Constant	-4.0826*	0.005	-4.0244*	0.005

INC3	Level	Constant + Trend	-2.5551	0.302	-2.5772	0.292
INC3	First Difference	Constant + Trend	-4.0678*	0.020	-4.0091**	0.023
STOK	Level	Constant	-0.8086	0.799	-1.0305	0.726
STOK	First Difference	Constant	-3.9257*	0.007	-3.8492*	0.008
STOK	Level	Constant + Trend	-3.0173	0.148	-2.1974	0.471
STOK	First Difference	Constant + Trend	-3.9590**	0.025	-3.9006**	0.028

Equation 1 - Dependent Variable: DPRICE				
Included observations: 24 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DSTOK	-0.538487	0.272726	-1.974461	0.0630
DPRICE(-1)	-0.159241	0.140848	-1.130591	0.2723
DDEM	-3.776906	0.687715	-5.491962	0.0000
DSUP	2.358436	0.418166	5.639950	0.0000
C	0.054077	0.032030	1.688336	0.1077
R-squared	0.728835	F-statistic		12.76699
Adjusted R-squared	0.671747	Durbin-Watson stat		2.104308

Equation 2 - Dependent Variable: DPRICE				
Included observations: 25 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DSTOK	-0.735210	0.258398	-2.845265	0.0097
DDEM	-3.373409	0.681096	-4.952915	0.0001
DSUP	2.443593	0.442550	5.521622	0.0000
C	0.044533	0.032575	1.367085	0.1861
R-squared	0.662260	F-statistic		13.72602
Adjusted R-squared	0.614012	Durbin-Watson stat		2.340804

Dependent Variable: DDEM				
Included observations: 24 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDEM(-1)	0.167374	0.187948	0.890533	0.3838
DPRICE	-0.117724	0.041113	-2.863454	0.0096
DINC	-0.727580	0.684728	-1.062583	0.3006
C	0.024229	0.012749	1.900436	0.0719
R-squared	0.294219	Durbin-Watson stat		2.059806
Adjusted R-squared	0.188352	F-statistic		2.779132
S.E. of regression	0.041740			

Dependent Variable: DSUP				
Included observations: 24 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DPRICE(-1)	0.137167	0.092403	1.484452	0.1533
DSUP(-1)	-0.165952	0.245900	-0.674876	0.5075
KOTA	0.002996	0.037824	0.079211	0.9377
C	0.008625	0.026367	0.327126	0.7470
R-squared	0.103502	Durbin-Watson stat		1.839018
Adjusted R-squared	-0.030973	F-statistic		0.769674